FENNIMORE
WISCONSIN

Wastewater Treatment Facility Facilities Planning Document

City of Fennimore, Wisconsin

October 2015

TOWN & COUNTRY
ENGINEERING, INC.

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Facilities Planning Document

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FACILITIES PLANNING DOCUMENT

City of Fennimore, Wisconsin

October 2015

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1. EXECUTIVE SUMMARY

1.1 General Overview

The City of Fennimore is undertaking facilities planning for its wastewater treatment facility (WWTF) to address equipment and process deficiencies, meet current and future permit requirements, and provide the staff with increased flexibility in dealing with daily operational conditions. This Facilities Planning Document establishes long term conditions for which the facility must be designed, and identifies processes and equipment that are to be upgraded or replaced to meet the overall goals set forth.

This Facilities Planning Document also takes into consideration the need for process modifications and upgrades to meet new effluent phosphorus water quality based effluent limits (WQBELs) that will take effect with the next permit issuance, but does not include an ultimate selection of alternatives for phosphorus compliance. The current phosphorus compliance schedule requires the submittal of a Facilities Planning Status Report in September 2015, which is fulfilled by this Document. The City will continue to evaluate feasible alternatives for meeting the final phosphorus limits, which may include facility upgrading, Watershed Adaptive Management, Water Quality Trading, or a water quality standards variance. The selected phosphorus compliance option will be described in a Preliminary Compliance Alternatives Plan that will be submitted by September 30, 2016 as an Addendum to this document, with a Final Plan submitted by September 30, 2017. One goal of this Facility Planning Document is to recommend modifications to the existing treatment plant that will maximize biological treatment and nutrient removal to decrease the amount of phosphorus removal/reduction that will be required by other means.

The planning process necessarily depends on input from various sectors of the community including City staff, private citizens, industries, and the commercial sector to become a successful planning tool. Historical records have been evaluated and projections have been made to establish long term needs. The recommended alternative for implementation is summarized in the following sections included within this chapter, however for a more detailed look at all alternatives evaluated, refer to the remaining chapters and appendices.

1.2 Conclusions

The existing WWTF was constructed in 1978-1979 and consists of primary clarifiers, biological treatment using rotating biological contactors (RBCs), secondary clarifiers, and tertiary filtration. Sludge from the primary clarifiers is digested in an anaerobic digester and stored on-site prior to land application. The plant site also contains an equalization tank and holding pond for flow equalization. The control building houses office and laboratory space, motor control centers, the plant headworks and influent pumps, boilers, a standby generator, and the tertiary filters. The current facility was designed for a flow of 0.620 million gallons per day (MGD), 1,300 pounds per day (lbs/day) BOD, 1,280 lbs/day suspended solids, and 52 lbs/day ammonia-nitrogen.

While the WWTF is currently meeting permit limits, there are several modifications needed to extend the life of plant for the next 20 years and provide adequate treatment for wastewater generated in the City of Fennimore service area. In particular, the RBCs are failing and are in need of replacement. The population within this service area is projected to grow by approximately 0.7% per year, for a projected year 2035 population of 2,875 (350 capita growth). In addition, growth has been projected for the commercial, industrial, and public authority sectors based on the 2003 Comprehensive Plan, available land in the Fennimore Industrial Park, and input from the City. Additional contributions come from future potential acceptance of leachate, septage and/or holding tank wastewater from outside sources. Currently the City accepts minimal amounts of hauled wastes, but based on a survey of local haulers and other WWTFs, it is felt that the demand for accepting hauled waste will increase substantially in the future.

Chapter 3 of this Facilities Planning Document focuses on the condition of the existing plant and the current flows and loads. Chapter 4 presents the future design conditions based on the projected growth. Chapter 5 identifies alternatives for plant upgrades to address current processes and structures that are at the end of their design life or in need of repair, as well as general plant issues and operational improvements. Chapter 5 also identifies options for compliance with new phosphorus WQBELs.

It is the City's intent to use a phased approach to address these issues, with the first phase of design and construction to include a comprehensive upgrade for the current processes and equipment. Subsequent phases will include upgrades to meet future design conditions and phosphorus WQBELs. The need for improved phosphorus removal to meet new permit requirements has been taken into consideration and will be more fully addressed in future planning and design submittals following the phosphorus compliance schedule in the WPDES permit.

1.3 Recommendations

Based on the economic and non-economic evaluations presented in Chapters 5 and 6, the recommended alternative for the first phase of plant modifications is Alternative 3, which includes construction of a new activated sludge system, without the existing primary clarifiers, to replace the RBCs, and the conversion of the anaerobic digester to aerobic digestion. This option has the lowest capital costs and lowest present worth cost among the three alternatives considered. Additionally, it provides the most flexibility for operations and meeting current and future nutrient limits. The annual operating expenses for this alternative are expected to be less than Alternative 1 but higher than Alterative 2 due to aeration demands.

The recommendations proposed for the first phase of construction are summarized as follows:

- Replacement of the influent pumps and associated valves
- Construction of a new headworks building housing screening, grit removal, and flow splitting between the equalization tank and forward flow through the plant.
- Upgrade of mixing in equalization tank
- Removal of the primary clarifiers or possible reuse as sludge thickeners
- Construction of selector basins and activated sludge basins with diffused aeration for secondary treatment
- Addition of a third final clarifier
- Construction of a process building to house aeration blowers, RAS and WAS pumps
- Addition of a new receiving station for hauled waste (holding tank and septage)
- Conversion of the anaerobic digester to aerobic digestion with blowers, diffusers, and aluminum cover
- Modifications to the Control Building, including laboratory, office space, and bathroom improvements
- Replacement of aging/obsolete electrical controls and original MCCs.

These improvements are recommended for Phase 1 of construction at the treatment plant, which is expected to begin in 2016 or 2017 depending on funding sources. Subsequent phases of construction, designated as Phase 2 and 3, will depend on the selected alternative for phosphorus compliance, the actual growth in the City of Fennimore, and future changes to the plant flows and loadings, such as the addition of major industry or acceptance of hauled waste. Phase 2 may include construction of a new filtration system for phosphorus removal, but other phosphorus compliance alternatives will be explored, as described in Section 5.5.

Phase 3 is assumed to include addition of sludge thickening facilities to extend the capacity of existing digester and sludge storage as well as additional secondary treatment capacity, as needed. If actual growth is slower than projected or if hauled waste does not become a significant portion of the influent load, the addition of capacity for Phase 3 may not be needed in the next 20 years. Costs for Phase 2 and 3 have not been including in the cost analyses and user charge rates developed in this document.

1.4 Cost Summary of Selected Alternative

The capital costs for the selected Phase 1 alternative are as follows:

Phase 1 Capital Costs:

Construction	$6,772,341
Contingency	$677,234
Engineering, Administration, & Legal	$1,015,851
Total	**$8,465,427**

As described in Sections 5.4 and 6.2, there are potential deductions or additions to these capital costs, as follows:

- Deduct for rehabilitating the existing headworks rather than construction of a new headworks.
- Additional cost for sludge thickening upgrades, which would likely be constructed as part of a later phase (Phase 3).
- Construction of a new heated storage shed/garage rather than insulating/heating the existing structure.

Refer to Chapter 6, Alternatives Comparison, and Appendix M for more detailed information on the cost breakout for all of the alternatives evaluated in this Facilities Planning Document.

1.5 User Charge Cost

Chapter 8 provides information on effects of implementing the recommended project on the City's user charge system. User charges for an average residential customer are expected to increase from the current average residential charge of $30 per month to between $41 and $49 per month in 2016, and increase to between $56 and $75 per month over the next six to seven years, depending on the methodology of the user charge system and the amount of grant money included in the funding package. These projected user costs are based on an average residential water use rate of 3,071 gallons per month, the total capital cost expenditure of $8,465,427 for Phase 1; the associated annual O&M and replacement costs described in Chapter 6; and the funding assumptions described in Chapter 8. These user rates do not take into account the possible addition of a filter that may be required for phosphorus removal, or other work that may be performed as part of Phase 2 or 3 construction.

1.6 Implementation Schedule

The City of Fennimore intends to apply for funding through United States Department of Agriculture (USDA) Rural Development's water and wastewater program and the Wisconsin Clean Water Fund (CWF) to finance Phase 1 construction. The following implementation schedule is based on the timelines for these loan programs. Due to the current state of the RBCs and potential for failure, the City intends to follow the accelerated schedule to have the upgraded WWTF running as soon as possible; however, the actual schedule will depend on the availability of financing and possible interim financing costs.

Proposed Implementation Schedule

	Accelerated Schedule	Normal Schedule
Submit Draft of Facilities Plan	October 15, 2015	October 15, 2015
Proceed with Preliminary Design	October 1, 2015	October 1, 2015
Submit CWF ITA	October 31, 2015	October 31, 2015
Public Hearing on Plan	November, 2015	November, 2015
Submit Rural Development Application	November 15, 2015	November 15, 2015
Proceed with Final Design	December 15, 2015	December 15, 2015
Approval of Facilities Plan	December 15, 2015	December 15, 2015
Obtain Preliminary commitment for Rural Development	January 15, 2016	January 15, 2016
Submit Plans and Specifications	May 1, 2016	September 30, 2016
Submit CWF Loan Application	May 1, 2016	September 30, 2016
Submit User Charge Rates/Ordinances	May 1, 2016	September 30, 2016
Advertise for Bids	May 1, 2016	October 1, 2016
Approval of Plans and Specifications	June 30, 2016	December 1, 2016
Open Bids	June 15, 2016	December 15, 2016
Clean Water Fund Closing	January 1, 2017	February 15, 2017
Award Bids	July 15, 2016	February 1, 2017
Start Construction	August 1, 2016	March 1, 2017
Complete Phase 1 Construction	December 15, 2017	August 1, 2018

2. INTRODUCTION

2.1 Planning Objectives

The intent of this Facilities Planning Document is to develop and evaluate viable alternatives for the upgrade of the existing wastewater treatment facility (WWTF) for the City of Fennimore. The WWTF was constructed in 1978 and has only had minor upgrades since that time, including upgrades for phosphorus removal by chemical addition and construction of a new sludge storage in 1998. Therefore, some processes and equipment are reaching the end of their useful life and are in need of replacement or upgrading. Additionally, the Wisconsin Pollutant Discharge Elimination System (WPDES) permit that was issued to the City in October 2013 (Appendix A) includes proposed water quality based effluent limits (WQBELs) for phosphorus that may require upgrades to the WWTF. This Facilities Planning Document takes into consideration the need for process modifications and upgrades to meet new effluent phosphorus limits that will take effect with the next permit issuance, but does not include an ultimate selection of alternatives for phosphorus compliance.

The compliance schedule for evaluating and implementing alternatives for meeting the new phosphorus limits requires the submittal of a Compliance Alternatives, Source Reduction, Improvements and Modification Status Report by September 30, 2015, which is fulfilled by this Document. The City will continue to evaluate feasible alternatives for meeting the final phosphorus limits, which may include facility upgrading, Watershed Adaptive Management, Water Quality Trading, or a water quality standards variance. The selected phosphorus compliance option will be described in a Preliminary Compliance Alternatives Plan that will be submitted by September 30, 2016, with a Final Plan submitted by September 2017. While this Facilities Planning Document does not fully address upgrades for phosphorus removal, these future requirements are taken into account throughout this plan.

This Facilities Planning Document includes an evaluation of the existing facilities both in terms of pollutant loadings and a detailed accounting of equipment and building conditions. Using historical data and appropriate demographic projections, future design parameters are established upon which the alternative design concepts are based. A comparison of the various alternatives is made to arrive at a viable and cost effective option that will meet the community's needs for the next 20 years. The recommended alternative must also have minimal negative environmental impacts and the capacity to meet the anticipated water quality limits of future discharge permits. A reasonable timetable for implementation is established to ensure that interim environmental concerns during construction will be minimized, while concurrently allowing the community adequate time to undertake the associated debt load.

2.2 Planning Area

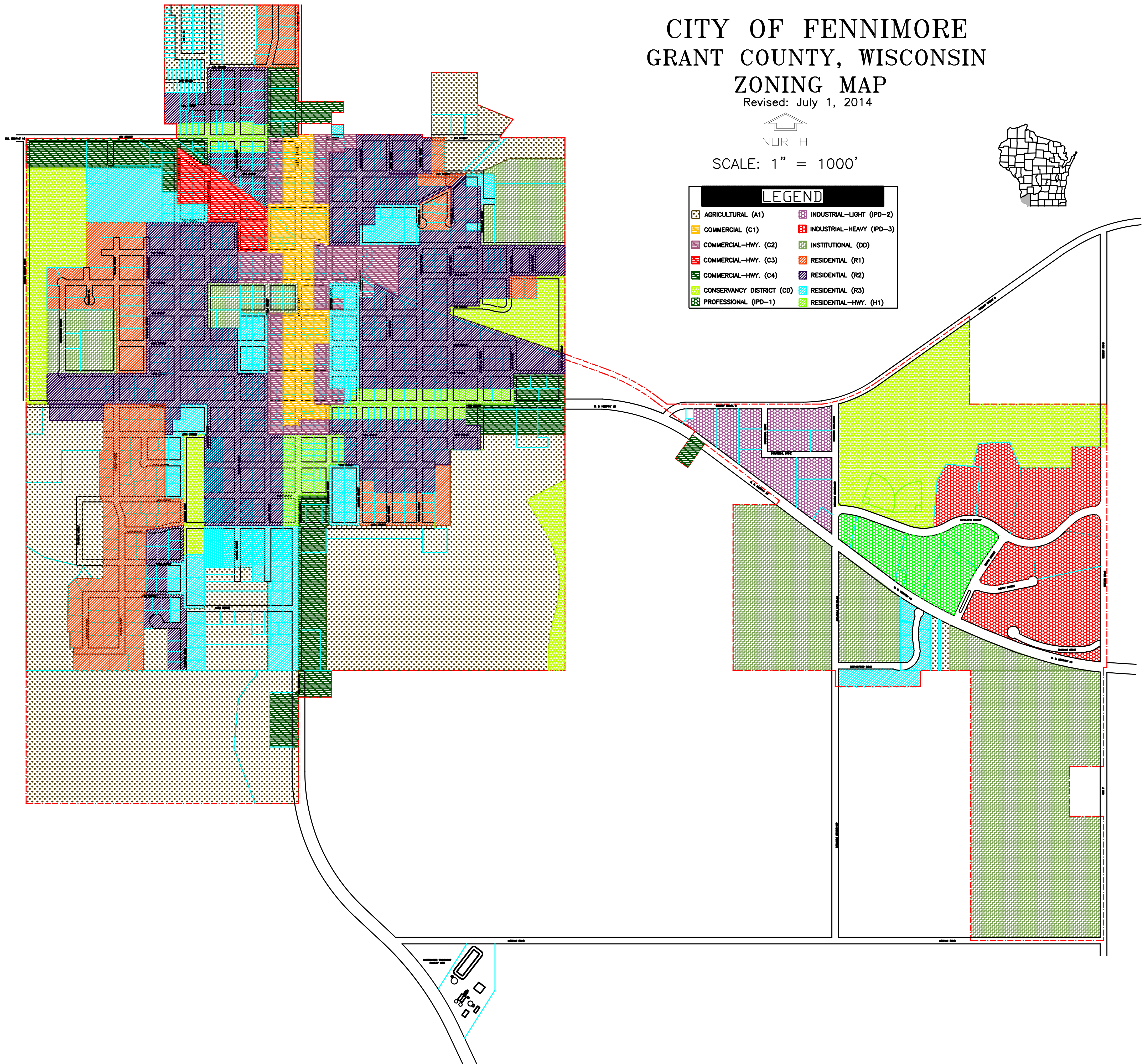
The City of Fennimore is located in Grant County in the southwest portion of Wisconsin at the intersection of U.S. Highways 18 and 61. It is about seventy miles west of Madison, WI and about sixteen miles north of Lancaster, WI, the county seat.

The current sanitary sewer service area includes those areas within the existing municipal boundaries, as shown on Figure 2-1, the current zoning map. The future sanitary sewer service area may include growth into undeveloped areas just outside the current City limits. Other small communities and townships in the vicinity, namely Mt. Ida Township, Fennimore Township, Liberty Township, and the Stitzer Sanitary District, were considered for regionalization/possible inclusion in the service area for the WWTF; however, none of these foresee a need for connection in the near future. The townships are served by private septic systems and the Stitzer Sanitary District has its own wastewater treatment facility.

2.3 Facilities Plan Approach

The planning process includes an evaluation of the existing loading data to the treatment facility and develops current baseline loading parameters for the facility. This includes values for flow, biochemical oxygen demand (BOD), suspended solids, ammonia, and phosphorus; all of which have limits included in the facility's current discharge permit. This evaluation is done in Chapter 3 of this report.

Chapter 4 presents the projected loads for the WWTF. Future loading increases are based on population projections, future land use, and consideration of the needs of any local industries that discharge to the City's facility. This has been done using information from the City's Comprehensive Plan, with direction from and ultimate approval by the City Council. Review and approval by the City Council, was a crucial step, since these projections have far reaching impacts for



CITY OF FENNIMORE
GRANT COUNTY, WISCONSIN
ZONING MAP
Revised: July 1, 2014
NORTH
SCALE: 1" = 1000'
LEGEND
AGRICULTURAL (A1)
COMMERCIAL (C1)
COMMERCIAL-HWY. (C2)
COMMERCIAL-HWY. (C3)
COMMERCIAL-HWY. (C4)
CONSERVANCY DISTRICT (CD)
PROFESSIONAL (IPD-1)
INDUSTRIAL-LIGHT (IPD-2)
INDUSTRIAL-HEAVY (IPD-3)
INSTITUTIONAL (DD)
RESIDENTIAL (R1)
RESIDENTIAL (R2)
RESIDENTIAL (R3)
RESIDENTIAL-HWY. (H1)

the City. A determination of new effluent limits was made by the WDNR based on the projected loading parameters.

With the future loading parameters, it is possible to formulate preliminary design alternatives that would accommodate the new loadings. Design alternatives are presented in Chapter 5 of this document. All alternatives presented use existing structures and equipment to the greatest extent possible to minimize eventual construction costs. Typically a new site alternate is included in the evaluation; however, given the space available at the existing site and the life expectancy of the existing structures, a new site was not considered.

Cost analyses of the selected alternatives were determined and an evaluation of each was made to include economic, human resources and environmental impacts. Once a decision is made as to the selected alternative, financing methods and an implementation plan can be formulated. These evaluation and implementation considerations are presented in Chapters 6 – 8.

3. EXISTING CONDITIONS

3.1 Description of Planning Area

The City of Fennimore is located on a ridge in the Western Upland area of Wisconsin also known as the "driftless" or "unglaciated" region. The City is home to Southwest Wisconsin Technical College, which has an enrollment of 1,650 students (full-time equivalent) and is located on the eastern side of the city next to the City's industrial park. The existing WWTF site is located on the southern edge of the city and discharges to the Gregory Branch of the Upper Grant River Watershed.

3.1.1 Climate

Typical of the Great Lakes region, the City of Fennimore experiences cold and snowy winters, hot summers, and moderate springs and autumns. The temperature ranges from an average of 17°F in January to 72°F in July. The average annual precipitation is 34 inches, the majority of which falls in April through September. Typically, the month of June is the wettest and January is the driest.

3.1.2 Physical Setting

The topography of the region is characterized by broad open hilltops and river valleys and steep wooded slopes, typical of the Driftless Area. The region is dominated by agricultural uses, in particular along the hilltops and valley bottoms. Karst topography is found throughout the area, characterized by shallow limestone bedrock, caves, sinkholes, springs, and cold streams. The City is located on a ridge at the intersection of U.S. Highways 18 and 61 in Grant County. Elevations in Fennimore proper typically range from 1,100 feet to 1,200 feet above mean sea level (AMSL).

3.1.3 Soils

The Natural Resources Conservation Service (NRCS) soil resource report for the existing WWTF site and the vicinity is included in Appendix B. Generally soils in this area can be classified as silty loams on slopes ranging from 2% to 15%, with some areas of steeper slopes.

3.1.4 Water Resources

Surface water resources within the City planning area include the Fennimore Fork/Castle Rock Creek, which is in the Blue River Watershed, the Big Green

River in the Green River and Crooked Creek Watershed, and Borah Creek, the Rogers Branch, and the Gregory Branch in the Upper Grant River Watershed

The existing WWTF discharges to the Gregory Branch, which has its headwaters within the City of Fennimore and is a spring-fed stream. The Gregory Branch flows southwest approximately 6.8 miles from its headwaters until it joins the mid-section of the Rogers Branch, which flows into the Upper Grant River north of Lancaster. Approximately two miles of the stream are considered Limited Forage Fishery (LFF) water primarily due to lack of flow, poor habitat, and non-point sources of pollution according to the WDNR website. The WWTF outfall is located within the LFF portion of the Gregory Branch. Only a lower one mile reach of its 6.8 mile length is considered as class II trout waters. The subwatershed for the outfall is the Headwaters Grant River (HUC12 = 0706000030104).

3.1.5 Floodplain Surveys

Flood Hazard Boundary Maps produced by the Federal Emergency Management Agency (FEMA) are not readily available for the City of Fennimore and the existing WWTF site. The WWTF is in a non-printed flood map area, indicating that it is likely not in a floodplain or the stream is too small to warrant floodplain mapping. Based on available information for the surrounding area, the existing site lies outside of the 100-year flood plain delineation and the nearest floodplain is associated with the Upper Grant River, downstream of the confluence of Borah Creek and the Rogers Branch and approximately 6.5 miles feet southwest of the WWTF site. The existing structures have not been recorded to have flooded. To avoid potential flooding problems, all new structures should be constructed at or above the existing first floor elevations and tank wall elevations.

3.1.6 Groundwater

Groundwater in Fennimore comes from deep sandstone aquifers and is used for the municipal water supply. There currently are two active high capacity wells in the city, which yield 500 to 1,000 gallons per minute each. Well 4, drilled in 1983, is 993 feet deep and Well 5, drilled in 1998, is 1,000 feet deep, both with static water levels ranging from 250 to 275 feet.

Overall groundwater quality is good and the only treatment done on the water is the addition of chlorine and fluoride. The water is considered hard at about 250 to 320 milligrams per liter (mg/L) as calcium carbonate ($CaCO_3$). Iron and manganese concentrations are below secondary drinking water standards.

3.1.7 Agriculture

There is no active agriculture at the existing WWTF but land in the immediate vicinity is actively being farmed. Contact will be made with the State of Wisconsin Department of Agriculture, Trade and Consumer Protection with regards to the potential impacts to agriculture land should a decision be made to use land outside of the current WWTF site. This will be covered in more detail in Chapter 7.

3.1.8 Historic and Cultural Assets

The extent of historic and cultural assets at the proposed work sites are covered in detail in Chapter 7 of this planning document.

3.1.9 Population and Land Use

The population of Fennimore increased steadily in the 1970s and 1980s and was relatively stable 1990s, as reported in the by the Wisconsin Department of Administration (DOA) census data and population estimates. Moderate growth has occurred between 2000 and 2010, with the City's population recorded as 2,387 and 2,497 residents, respectively. The DOA projected 2015 population is 2,505. According to the City's Public Service Commission (PSC) reports for the water utility, the City serves a population of 2,505 inside the municipality and 20 outside the municipality, for a total served population of 2,525. For this Facilities Planning Document, the base population for 2015 was assumed to be 2,525. Projected population increases from this baseline figure will be used to estimate future flows and loadings in Chapter 4.

A Comprehensive Plan for the City and Town of Fennimore was prepared with assistance by the Southwest Regional Planning Commission and was adopted by the City Common Council in October 2003. The Comprehensive Plan presents land use for the main sectors of the community including residential, commercial, public, manufacturing/industrial, parks/recreation and agricultural areas based on the City's land use map at the time. Excerpts from the Comprehensive Plan are provided in Appendix C. The current population estimate and demographic land use percentages from the Comprehensive Plan are provided below in Table 3-1.

Table 3-1
Demographic and Land Use Information

Sector	Percent of Land Area
Estimated 2015 Population	2,525 people
Land Use	
Residential	24.5%
Commercial	4.6%
Manufacturing/Industrial	3.6%
Public/Government	8.5%
Parks/Recreation/Conservancy	9.2%
Vacant Lots	9.3%
Agricultural	21.6%
Streets	18.7%
Total:	100%

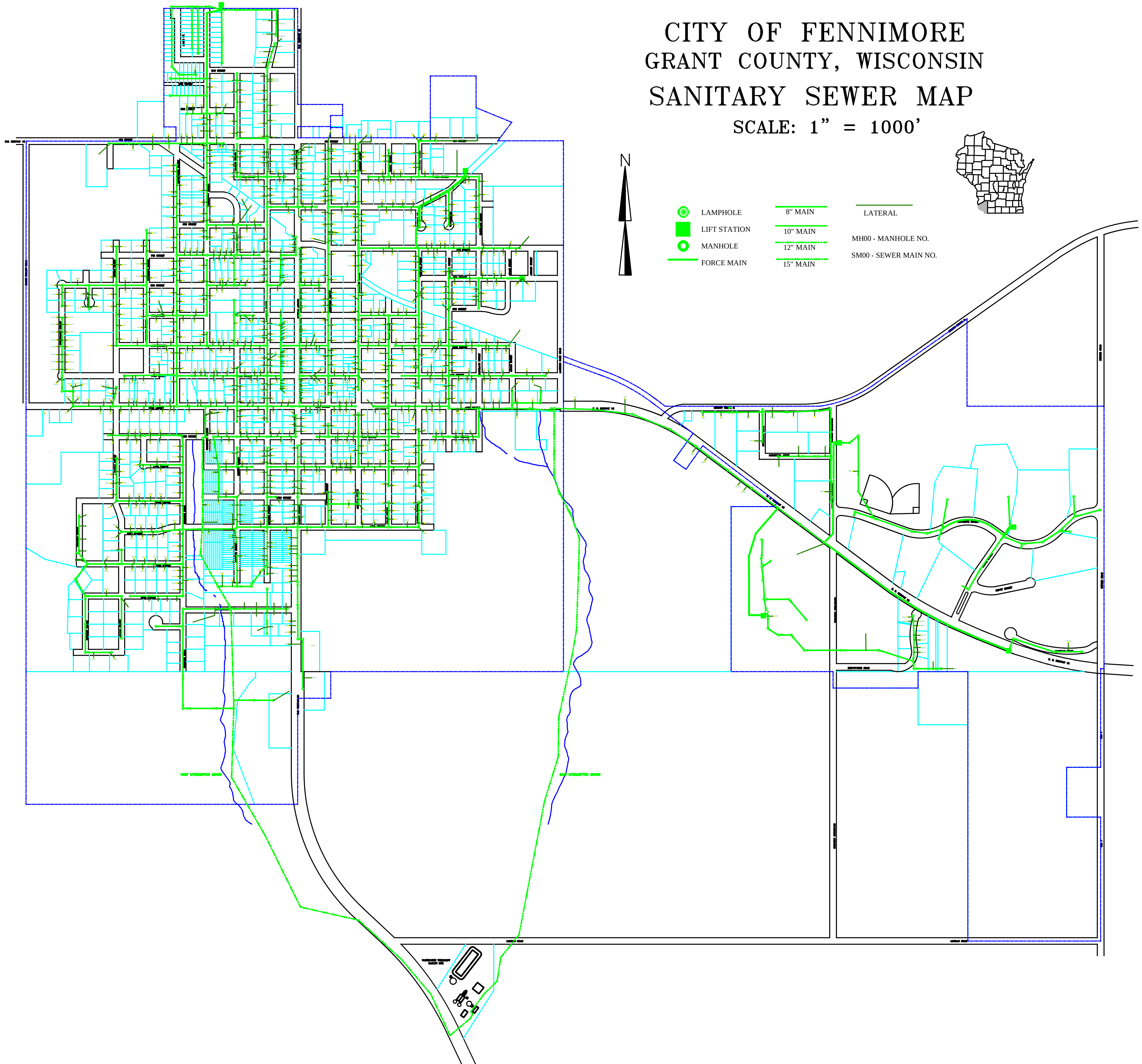
3.2 Description of Existing Facilities

3.2.1 Sanitary Sewer Collection System

The City's collection system includes seven lift stations and approximately 24 miles of sanitary sewer pipes ranging in size from 6 to 15 inches in diameter. Pipe materials include clay, PVC and cast iron. Table 3-2 lists the various pipes and lengths included in the sewerage system. The City has been replacing and upgrading these pipes during improvement projects implemented periodically. The overall emphasis of the projects is to replace defected pipelines and to modernize the existing pumping stations. The sanitary sewer map is shown on Figure 3-1.

Table 3-2
Existing Sanitary Sewer Inventory

Diameter (inches)		**Length (feet)**
Force Main	6	7,064
Collection Sewers	8	92,020
	10	5,720
	12	7,561
	15	8,320



CITY OF FENNIMORE
GRANT COUNTY, WISCONSIN
SANITARY SEWER MAP
SCALE: 1” = 1000’
N
LAMPHOLE
LIFT STATION
MANHOLE
FORCE MAIN
8" MAIN
10" MAIN
12" MAIN
15" MAIN
LATERAL
MH00 - MANHOLE NO.
SM00 - SEWER MAIN NO.

Wastewater flows to the WWTF through two gravity interceptors called the east and west interceptor. The east interceptor is 12 inches in diameter and begins at 12th Street and Marsden Park, serving the east portion of the City including the industrial park and SWTC. The west interceptor begins as 12 inches in diameter at 12th Street and Roosevelt Street and increase to 15 inches in diameter, serving the west and central areas of the City. Both interceptors combine at the manhole (MH 1P) just south of the WWTF Control Building and from there flow to the plant headworks. The interceptors appear to have adequate capacity to handle current and future peak flows. In general, the interceptors are in good condition, but there are some known problems with infiltration and inflow in other parts of the collection system. The City is in the process of developing a Capital Improvements Plan and the following projects have been identified for implementation in the next five years:

- Upgrade electrical and add SCADA for the seven lift stations.
- Purchase of a jet/vacuum truck for grit removal in the collection system
- Sewer replacement/upsizing for Washington St from (9th to 12th), identified as a major contributor of infiltration into the sanitary sewer system.
- Sewer replacement for Madison St (2nd to 4th), Coolidge Ct, Grant St. (11th to 12th), Garfield St (12th to 13th), 13th St (Garfield to Grant).
- Sewer replacement on Jackson St (6th to 7th), Coolidge St (7th to 9th) and Brownwood Rd.
- Sewer replacement for 2nd St (Madison to Roosevelt), 5th St (6th to Cleveland), Coolidge St (5th to 7th and 9th to 10th), 7th St (Cleveland to Adams).
- Sewer replacement for James Ct, 3rd St (Monroe to Roosevelt), Monroe St (3rd to 4th), Madison St (6th to 7th), Garfield St (13th to 14th).
- Sewer replacement for 4th St (east of Garfield), 11th St (Jefferson to Lincoln and Monroe to Roosevelt), Grant St. (11th to 13th) and 14th St (Garfield to Grant).

3.2.2 Wastewater Treatment Facility

The City of Fennimore WWTF treats the municipal and industrial wastewater collected by the sewerage system. The original trickling filter secondary treatment plant was built in the 1935 and was located on the City's southwest side. In 1978-1980, the plant was moved to the existing site, southeast of the previous facility. The plant consisted of primary clarifiers, biological treatment using rotating biological contactors (RBCs), secondary clarifiers, filtration, and chlorine contact. Sludge from the primary clarifiers was digested in an anaerobic digester and then sent to sludge drying beds. The plant site also contained a 358,600 gallon equalization tank and an 800,000 gallon holding pond for flow equalization. The control building housed office and laboratory space, motor control centers, the plant headworks and influent pumps, oil and gas-fired boilers, a standby generator, tertiary filters, and chlorination storage and equipment.

In 1998, the facilities were upgraded to include a sludge storage tank and chemical feed equipment for phosphorus removal. The upgraded facility was designed for a flow of 0.620 million gallons per day (MGD), 1,300 pounds per day (lbs/day) BOD, 1,280 lbs/day suspended solids, and 52 lbs/day ammonia-nitrogen.

Refer to Figure 3-2 for a site plan of the existing WWTF. Existing processes are described in more detail below.

- Flow Monitoring - Measurement of the forward flow through the facility is performed at two locations, plant influent flow at a 9-inch Parshall flume downstream of the screen and flow to the primary clarifiers at a 3-inch Parshall flume in the primary control structure. Ultrasonic flow devices mounted at metering flumes measure the total flow into the headworks and flow to the primary clarifiers. Flows are recorded on a 24-hour circle charts, 0-2,500 gpm for influent flows and 0-500 gpm for flows to the primary clarifiers. The operator must change the charts daily.

- Sampling – Raw wastewater samples are collected from near the 9-inch influent Parshall flume by an ISCO Model 3710 automatic sampler. An ISCO Model 3710 automatic sampler is also used to sample final plant effluent.

- Preliminary Treatment - Preliminary treatment at the facility consists of mechanical screening. A Lakeside MicroStrainer (Model 12MS-0.25-55) with a rated peak flow capacity of 1 MGD was installed approximately 9 years ago to replace the original comminutors. Screenings are washed and compacted in the unit, discharged to a dumpster, and then landfilled. Replacement of the screen is recommended because it is undersized to handle current average and peak flows. Flooding of the influent channel has occurred during peak flows.

  A coarse bar screen located in a parallel channel is available for use when bypass of the fine screen is necessary. Two valves are located in the comminutor room. One controls flow from the tertiary filter mudwell to the wet well and the other controls amount of treated effluent flow recirculated

FIGURE 3-2
CITY OF FENNIMORE
GRANT COUNTY, WISCONSIN
EXISTING WWTF SITE PLAN

back through the plant. Recirculation of effluent is currently not performed.

No grit removal is performed currently, but grit removal is recommended for future plant improvements. Grit buildup in the collection system is significant problem according to the operations staff.

- <u>Raw Pumps</u> - After screening, wastewater falls into the wet well and is pumped to the Equalization Tank by the raw pumps. The water surface in the wet well is controlled by the liquid level control, which automatically starts and stops the raw sewage pumps. The raw sewage pumps are located in the pump room of the Control Building and consist of three 15 horsepower (hp) FMC/Chicago Pump centrifugal pumps rated for 475 gpm at 65 feet (ft) total dynamic head (TDH), each. When in automatic mode, these pumps are controlled by a transducer in the wet well, which recently replaced the original bubbler control system. A sump pump in the floor of the pump room discharges to the wet well. The wet well structure has not been inspected recently but is believed to be in good condition with no major structural issues. The pump room is in need of sand-blasting and repainting.

  In recent years, there have been significant problems with the controls and variable frequency drives (VFDs) for the raw pumps and with the pumps themselves, as well as difficulty in finding spare parts for this equipment. In early 2015, the City installed new controls and VFDs for the pumps because these were in need of immediate replacement to ensure operational reliability. The pumps have also reached the end of their useful life and replacement is recommended.

- <u>Stormwater Pump</u> - The pump room also contains one 30 hp FMC/Chicago stormwater pump rated for 1,000 gpm at 70 ft TDH. During storm events, excess flow to the wet well is pumped to the stormwater pond by the stormwater pump. The stormwater pump can be controlled manually or automatically by the transducer control system. Dry well and wet well flooding events have occurred in 2008 and 2010, indicating that the storm pump capacity is not adequate for dealing with large storm events.

- <u>Equalization Tank</u> – The equalization tank is a 358,600 gallon concrete storage tank located on the hill above the primary clarifiers. Under normal conditions, all wastewater entering the plant is pumped to the equalization tank though a divider box located just outside the tank. The tank can be used for either side-line equalization, where only the flow greater than a certain quantity is temporarily stored, or “in-line equalization” where all flow goes through the tank. For side-line equalization, when influent flow is less than 430 gpm, flow passes through the V-notch weir in the divider box and flows down to the primary clarifiers. When the flow is greater than 430 gpm, the flow splits and approximately 430 gpm goes through the V-notch weir while the balance of flow spills over a stainless steel weir and discharges through the 8-inch pipe into the equalization tank. When influent flow rates decrease below 430 gpm, stored wastewater flows from the tank to the primary clarifiers. The equalization tank structure and roof appear to be in good condition, with the exception of the splitter structure, which has significant concrete corrosion/spalling and needs repairs. The 6-inch check valve on the tank inlet/outlet piping needs to be replaced.

The equalization tank is equipped with a jet aeration system to aerate and mix the tank contents and prevent septic conditions. The blowers for the jet aeration system are located in the building up the hill from the equalization tank. The jet system, manufactured by Pentech, consists of two submersible pumps and two blowers and uses a recirculated liquid stream from the basin and air from the blowers to maintain solids in suspension. The current mixing system is adequate and could be maintained for future use with minor upgrades.

- <u>Storm Water Pond</u> – The storm water pond is a sealed, rectangular shaped pond on the northeast end of the WWTF site, with a capacity of 800,000 gallons at the normal water depth of 6 feet. The bottom elevation is 1087.0 and the top of dike elevation is 1096.0. When the equalization tank overflows at elevation 1089.0, flow is directed to the storm water pond. This occurs periodically but not every year.

  The stormwater pond does not drain automatically. Discharge back to the equalization tank of the plant is controlled by a valves on the inlet/outlet piping and is recommended when plant flows are less than 430 gpm. The overflow for the pond is a 10-inch pipe from the pond to the equalization tank at elevation 1095.0 (one foot below the top of the dike).

  According to design information, the basin liner is composed of a minimum of 1 foot of compacted clay, 6 inches of compacted gravel, and 2 inches of bituminous surface, with a minimum of 3 feet of compacted clay over rock formations. The pond was repaved in 2014 and is in good condition.

- Primary Treatment – The facility has two rectangular primary clarifiers, each measuring 11 feet wide by 35 feet long, with an average sidewater depth of 7 feet. The chain-driven flights for scum and sludge removal have 1 hp drives. Sludge is pumped from the clarifiers by pumps located in the digester building. The scum pit for clarifiers can be also be pumped to the digesters with the sludge pumps. The mechanical components in the south clarifier were replaced in 2014.

  A motorized valve (V59) controls the flow rate through the primary clarifiers as part of the flow equalization system. The valve was intended to limit the forward flow through the plant to 430 gpm. The motor operated valve automatically opens and closes in response to signals from the flow meter located at the 3-inch Parshall flume downstream of the valve, closing to restrict flow as the flow rate is increasing. The building that houses the flume and motorized valve has no ventilation and may require HVAC and electrical upgrades to meet current code standards.

  The plant can operate with one or both primary clarifiers on-line. Effluent from the clarifiers is split to the two RBC treatment trains by the splitting structure downstream of the clarifiers. Flow can also be bypassed around the primary clarifiers to the RBCs or the tertiary filters.

  At current average flows, surface overflow rates for the primary clarifiers are approximately 330 gallons per day/square foot (gpd/sf). Using the NR 110 maximums of 1,000 gpd/sf for average flows and 1,500 gpd/sf for peak hourly flows, the clarifiers could handle up to 0.770 MGD design average and 1.155 MGD peak hourly flows.

  Operational problems that have been noted for the primary clarifiers including scum/sludge freezing next to the skimmers and the accumulation of a thick layer of black sludge at night when the equalization tank bleeds back, believed to be due chemical phosphorus removal floc formation in equalization tank. The current scum/sludge pumping system is functional but should be upgraded to allow for more flexibility and automated operation, which would help with some of the clarifier operational issues.

Rotating Biological Contactors – The facility includes two RBC treatment trains, each consisting of four banks of rotating units. The rotating media is Aero-Surf media produced by the Autotrol Corporation. A total of 900,000 square feet (sq. ft.) of media surface is provided on the 8 rotating shafts. The RBC basin dimensions are 60’10” long by 26’4” wide with baffle walls between each rotating unit. The basins have a sidewater depth of 5’1” to provide partial submergence of the rotating media.

The rotating media provides a surface for the development of fixed-film biological growth as well as aerating and mixing the wastewater. The RBCs were designed with the intent that the first rotating unit in each train would develop the largest biomass load, which generally removes BOD from the wastewater. The final units will develop a biomass containing nitrifying bacteria capable of removing ammonia from the wastewater.

Aeration is provided to the RBC tanks by two 1,400 standard cubic feet per minute (scfm) Sutorbilt Blowers California Series 7LBV to cause the RBC units to rotate, increase the dissolved oxygen in the wastewater, and provide additional shear force to strip excess biomass from the media. Blowers are located in the building south of the primary clarifiers.

The RBCs were designed for a load of approximately 650 lbs/BOD per train. While current loadings are just over half of the design load, the RBCs have experienced significant operational problems due to age. The media is failing/crumbling, there is substantial damage to the air cups, and some of the shafts appear to be sagging, which reduces the rotational speed, and ultimately leads to the shafts being unable to rotate. The RBC units have reached the end of their useful life and upgrade or replacement is recommended.

- Final Clarifiers - The final clarifiers are circular tanks located just west of the RBC units. The tanks measure 28 feet in diameter with a 12-foot side water depth and outboard effluent launders. The structures and aluminum covers are from the 1970s plant construction, but the original FMC collector systems were replaced in 2006 with stainless steel Hi-Tech clarifier mechanisms.

  The current surface overflow rates are less than 300 gpd/sf at average flows. At the current peak flow of 430 gpm (the rate at which flow to the primaries is controlled), the surface overflow rates for the clarifiers are approximately 500 gpd/sf. Using the NR 110 maximum of 1,200 gpd/sf for peak flows, the clarifiers could handle up to 1.478 MGD peak hourly flows.

The sludge and scum are collected in the sludge wells between the two clarifiers and flow by gravity to the head of the plant via an 8-inch drain line to the influent interceptor. The contents of the sludge wells can be pumped to the digester by the sludge pumps in the digester building; however, normal and recommended operation is gravity flow to the head of the plant. Solids are then subsequently removed from the system through the primary clarifiers.

- Tertiary Filters – Effluent from the final clarifiers is polished in the tertiary filters, which were manufactured by Suburbia Systems, Inc. The filtration system consists of four 6-foot by 7-foot cells containing 27 inches anthracite with total surface area of 168 sq ft. A distribution system divides flow between the four cells and the underdrain system removes filtered effluent and distributes air and backwash water through the media. The system is designed to back wash one cell at time using an air/water scour system with two 350 gpm, 7.5 hp Cascade pumps (Model 6MF) and two 250 cfm, 10 hp Sutorbuilt blowers (Model 5MV-B)

  Backwash water flows to the mudwell located beneath the boiler room floor between the filters and the wet well. The mudwell can be drained to the wet well by opening a valve or will overflow to the wet well at elevation 1051.0. The mudwell will hold approximately 13,800 gallons before overflowing to the wet well.

  Effluent from the filters flows to the clear well outside of the Control Building and from there to the chlorine contact chamber. The clear well is 8 feet deep and holds 14,360 gallons. It is designed to maintain the water level at elevation 1051.0 in both the clear well and the filter cells to keep the filter media constantly submerged. The clearwell provides backwash water for the filters via a 2-foot by 3-foot opening in the wall to the backwash sump. Problems with algae growth have been noted at the clear well.

  In recent years there have been failures of minor mechanical components such as valves and actuators, which have been replaced, and deterioration of the filter structure mainly due to rust. An evaluation of the filter was performed in February 2013 by Town & Country Engineering, and the results and recommendations are provided in the memorandum in Appendix D. The areas experiencing significant deterioration include corrosion on the exterior of the filter, corrosion around the base of the filter and subsequent leaks along the perimeter, rust formation on metal components interior to the filter structure but above the normal water line, and wear on the valves and actuators. Repair of these structural/corrosion issues is needed if the filter will remain in service after upgrades to the WWTF.

- Chlorine Contact Tank – The chlorine contact tank is next to the clear well and is similar in size, with a depth of 8 feet and a volume of 14,360 gallons. Disinfection is currently not required at the plant, so the chlorine contact tank is no longer in use. The Fischer Porter chemical feed system consists of two Series 70C4400 chlorinators.

- Post Aeration – Effluent from filters flows through a 10-inch diameter pipe to a manhole and from there is conveyed by a 12-inch diameter gravity outfall sewer to a post aeration manhole on the other side of Highway 61.

  The post aeration manhole has a weir and 3.5 foot drop to entrain air and increase dissolved oxygen concentrations in the effluent. From there, the outfall sewer makes a 90-degree bend before discharging to the Gregory Branch of the Grant River in the Upper Grant River Watershed.

- Sludge Digestion – Sludge from the primary clarifiers is pumped to the anaerobic digester. The existing standard-rate, moderately to completely mixed, mesophilic, anaerobic digester is a 45-foot diameter concrete tank with floating cover. The bottom is tapered to the center for sludge removal. The maximum side water depth is 19’-8” and the total volume of the tank is 234,000 gallons (excluding the 5’-6” bottom cone). The digester is mixed by a central, top-mounted mixer and by discharging/recirculating sludge. The digester structure appears to be in fair condition, but the cover has not been inspected recently and its condition is unknown.

  Two sludge pumps located on the lower floor of the digester building are used to pump raw sludge into the digester and for pumping digested sludge to the sludge storage tank. These pumps are Carter model 800 simplex piston pumps rated for 40 to 90 gpm each (adjustable stroke) and 35 ft TDH. The pumps are controlled manually and a sight glass on the suction line at the digester can be used by the operator to check the consistency of the sludge during pumping. These pumps have experienced mechanical problems and require replacement or overhauling.

The process digests the sludge and scum pumped to digester from the primary clarifiers, with intermittent sludge feeding and withdrawal and operation of the heat exchanger to maintain proper process temperature. Heat for the Carter heat exchanger, rated for 250,000 BTU, is provided by methane- and liquefied petroleum (LP or propane) boilers located in the Control Building. A three-way valve blends hot water from the boilers with cooler recirculated water to provide 140-degree water to the heat exchanger. The digester gas boiler was replaced in 2014 and is currently used approximately 5 hours per day on average, and up to 20 hours per day maximum.

Sludge is pumped from the digester to the heat exchanger and back by two 2 hp Fairbanks Morse/Chicago Pump centrifugal recirculating pumps located on the upper floor of the digester building. These pumps are capable of pumping 150 gpm at 15 feet TDH and operate whenever the sludge pumps are operating. The recirculating pumps and the heat exchanger are also automatically controlled to maintain the desired sludge temperature (generally 90 to 95 degrees F).

The weight of the digester floating cover provides pressure for the methane gas. Methane gas is used by the boiler until the gas pressure is too low, then the boiler shuts off and an LP gas boiler is used. The digester gas collection system includes a pressure regulating valve (PRV) that will discharge excess methane to the waste gas burner. Should the PRV fail, a second pressure relief valve is located on the cover. The gas collection system is protected by flame arrestors and flame traps. The gas collection system is in poor condition and needs complete replacement.

Supernatant from the digester can be drawn off from three draw-off pipes. A dry sink in the basement of the digester building with sample lines from each of these draw-off points can be used to determine which level has the clearest liquid for supernatant removal. Supernatant is sent to the head of the plant via a 6-inch diameter drain pipe that discharges to the east influent interceptor.

The digester has excess capacity available for future loading. The digester was designed for a loading of 20 to 30 lbs of volatile solids per day per cubic foot and the current loading is well below the standard 40 pounds of volatile solids per 1,000 cubic feet for moderately mixed anaerobic digesters. Current discharge of primary sludge to the digester averages about 2,000-2,500 gpd, resulting in a hydraulic detention time of approximately 93 days.

Problems that have been noted with digester are that the position of the floating cover cannot be monitored, automated sludge removal is no longer possible, and decanting the digester upsets the plant. If the existing digester is reused for any facility upgrade, the existing boiler/heat exchanger, recirculation pumps, and piston pumps will have to be considered for replacement as they are nearing the end of their useful life. Replacement or modification of the gas collection system will also be required. Additionally, the digester structure and cover will need to be inspected to determine the extent of repairs needed and whether the cover needs to be replaced.

- <u>Sludge Thickening</u> – Sludge thickening is performed by decanting from the anaerobic digester or sludge storage tank.

- <u>Liquid Sludge Storage</u> – The existing sludge storage tank is a 595,000 gallon stainless steel tank that was added in 1998. The tank has an inner diameter of 73 feet and is 20.5 feet tall with a sidewater depth of 19 feet. The tanks is equipped with a JetMix vortex mixing system and over-the-top sprayer/mixing gun. One 50 hp Vaughn chopper pump rated for 2,000 gpm at 47 ft TDH is used to mix the contents of the tank and pump sludge to the tanker connection. The pump is located in the basement of the digester building and can be controlled by a control panel in the building and a remote disconnect switch at the truck draw-off standpipe.

  A 10-inch suction pipe allows withdrawal of sludge from the tank center and three 8-inch pipes with adjustable nozzles are connected to the sludge pump for sludge discharge and mixing. Supernatant can be decanted from the tank through four 6-inch decant lines and or through the overflow pipe at elevation 1076.20.

  The tank was sized to provide a minimum of 180 days of sludge storage capacity at the design flow conditions. The tank currently provides 260 days of storage with approximately 16,000 gallons of sludge pumped to the tank each week. Decanting is performed as needed to allow for additional storage. The tank and the sludge pump are in good condition with no known problems.

- Sludge Disposal – All of the sludge from the existing facility is land applied as a Class B liquid on agricultural fields. This is done prior to crops being planted in the spring and after harvest in the autumn. Sludge hauling is performed by the City and ample acreage available for sludge spreading.

- Septage/Holding Tank Receiving – The current WWTF does not have a formal hauled waste receiving station and does not accept hauled waste. The only way to accept hauled waste is by pumping directly to one of the influent manholes.

- Chemical Feed – The chemical feed system was installed in 1998 and consists of two LMI B131-72S metering diaphragm pumps capable or manual or automatic (flow-paced) operation, five 300-gallon storage tanks, one 150-gallon day tank, a chemical transfer pump, and chemical feed lines to the inlet structure just prior to the primary clarifiers, the splitter box after the RBCs, and a stubbed-off line for future use. There are two feed points at the splitter box to allow for use of either of the final clarifiers or both at the same time. The system is capable of feeding any of the conventional phosphorus removal chemicals; however, alum has been successfully used since the system was installed. Under current normal operations, alum is fed only to the splitter box following the RBCs.

- Site Piping – No specific issues have been identified with site piping, but several yard valves need to be replaced.

- Standby Generator – The standby generator is Katolight 415 BHP, water-cooled, diesel-fueled 2-cylce, 8-cylinder engine operating at 275 KW, 60 Hz. The generator and the automatic transfer switch were original to the plant and were installed in 1978. The generator is reported to be in good condition.

- Electrical Service - Electrical service to the plant is 480 V, 300 KW supplied by the Fennimore Electric Utility.

- Controls – Controls for the plant have not been significantly upgraded since the 1978 construction and are in need of replacement. The original Motor Control Center (MCC), is located in the Control Building between the laboratory and the generator room. The influent pump controls were replaced in 2015 due to failure/reliability issues.

- Process Control Building and Shop/Garage – If retained for future use, the following upgrades are recommended for the process control building:
  - Replacement of tile floors due to cracking/heaving.
  - Modifications to insulation and HVAC for efficient temperature control
  - Laboratory improvements
  - Possible roof replacement
  - Evaluation of bathroom/locker/shower space and accessibility requirements

  The current garage/shop building is unheated. A heated building is desired for storing a jet/vacuum truck and use as a shop in the winter.

3.3 Existing Facility Evaluation

According to the design information for the original plant and the 1998 modifications, the WWTF is designed for the following loadings:

Table 3-3
Existing Facility Capacities

Parameter	Design Value
Flow (MGD)	0.620
BOD (lbs/day)	1,300
Suspended Solids (lbs/day)	1,280
Ammonia – Nitrogen (lbs/day)	52

As described further in Section 3.5, the current flows and loadings to the plant are within the design capacity. The plant has been performing well, but several issues have been identified for further consideration in this facilities plan, as follows:

- Replacement of aging raw sewage pumps and storm pump
- Replacement of undersized influent screen
- Replacement of aging controls and VFDs
- Repair of the splitter structure for the equalization tank

- Operational enhancements for the primary clarifiers, including automated sludge pumping
- Replacement or upgrade of the RBC units, which have reached the end of their useful life
- Replacement or repair of the tertiary filters due to structural/corrosion issues
- Replacement of inadequate mixer and aging heat exchanger and gas handling system for the anaerobic digester, along with inspection/rehabilitation of the existing structure and cover
- Improvements to correct HVAC and electrical problems for plant buildings

3.4 Existing WPDES Summary

The discharge limits in the October 2013 WPDES permit for the City of Fennimore WWTF are summarized in Table 3-4. See Appendix A for a copy of the complete permit.

Table 3-4
Existing WPDES Permit Limits

Parameter	Limits
BOD (monthly average)	15 mg/l
BOD (daily maximum)	30 mg/l
TSS (monthly average)	20 mg/l
TSS (daily maximum)	30 mg/l
Ammonia-N (daily maximum)	11 mg/l
Ammonia-N (weekly average)	8.0 mg/l (Apr 1 – Apr 30) 3.4 mg/l (May 1 – Sep 30)
Ammonia-N (monthly average)	3.3 mg/l (Apr 1 – Apr 30) 1.5 mg/l (May 1 – Sep 30) 5.4 mg/l (Oct 1 – Mar 31)
pH	6.0 – 9.0 standard units (s.u.)
Phosphorus (monthly average)	1.0 mg/l
Dissolved Oxygen (daily min)	4.0 mg/l
Chloride (weekly average)	510 mg/l

The limit for total phosphorus is noted as an interim limit, effective July 1, 2013, with final effluent limits to be met after completion of an extended compliance schedule of nine years. The anticipated final water quality based effluent limits for phosphorus are 0.075 mg/l (0.39 lbs/day) as a six month seasonal average and 0.225 mg/l as a monthly average. These numbers may be recalculated if relevant additional information or data is submitted before the next permit issuance.

The WWTF was granted a variance from the calculated chloride limit of 400 mg/l in its previous permit and was granted a continuance of that variance in its current permit due to the lack of feasible treatment alternatives. As a condition of this variance, a compliance schedule was included for the City to look at source reduction and strive to meet the target value of 400 mg/l.

3.5 Wastewater Flows and Loadings

3.5.1 Wastewater Flow

In order to differentiate between actual wastewater flow and infiltration and inflow (I/I), historical water use and facility influent records are evaluated. After separating I/I as a quantified component in the overall influent flow value, future flow increases can be better determined for actual wastewater flows from the residential, commercial, public and general industrial sectors of the community.

Billed sewer flow information for the period 2009 through 2013 is provided below in Table 3-5. The billed sewer flow for the residential, commercial, industrial, and public sectors is based on metered water usage except for customers that have sewer/deduct meters to adjust for water purchased but not discharged to the City's collection system. Water use records and billed sewer flows for the period of evaluation can be found in Appendix E.

Table 3-5
Summary of Billed Sewer Flow

Year	Billed Sewer Flow (MGD)				
	Residential	Commercial	Industrial	Public	Annual Average
2009	0.0994	0.0300	0.0148	0.0124	0.157
2010	0.1001	0.0296	0.0145	0.0147	0.159
2011	0.1019	0.0305	0.0151	0.0119	0.159
2012	0.1007	0.0303	0.0146	0.0135	0.159
2013	0.1003	0.0301	0.0132	0.0143	0.158
Average	0.1005	0.0301	0.0144	0.0133	0.158
Average gallons per capita (customer) /day	40	237	5,308	265	

The difference between the total annual average City billed sewer flow shown above and the actual recorded flow at the plant should provide an indication of the total I/I entering the collection system. Recorded wastewater flows at the WWTF are provided in Appendix F and summarized in Table 3-6.

Table 3-6
Facility Wastewater Flows

Year	WWTF Influent Flows (MGD)					
	Annual Average	Max Month	Sustained Minimum	Sustained Maximum	Max Week	Max Day
2009	0.261	0.320	0.200	0.356	0.404	0.598
2010	0.310	0.457	0.205	0.539	0.651	1.197
2011	0.247	0.345	0.196	0.417	0.437	0.522
2012	0.197	0.210	0.180	0.221	0.229	0.331
2013	0.247	0.369	0.161	0.511	0.626	0.866
2014	0.251	0.316	0.161	0.391	0.406	0.663
Average	0.252	0.336	0.184	0.406	0.459	0.696
Average (3 highest values)				0.489	0.571	0.909

Influent flows to the WWTF included in Table 3-6 are annual averages, sustained averages, and maximum monthly, weekly, and daily flows. Sustained averages are defined as the maximum average wet weather flows and the minimum average dry weather flows for each year being evaluated. The sustained maximums are longer-term wet weather flows at least two weeks in duration which could impact the biological treatment capacity of the plant. The maximum daily flow values are, as the name implies, the peak daily flows on record for each year.

In addition to these flows, which are based on the daily plant flows, the influent circle recording charts were reviewed for several storm events in 2014 to determine the current peak hourly flow to the plant. In 2014, a peak hourly flow of approximately 1,275 gpm, or 1.836 MGD, occurred on June 29, 2014 during a 1.8-inch precipitation event. Other peak events close to 1,200 gpm were also recorded during wet weather.

The dry weather, annual average, sustained wet weather and maximum daily I/I were calculated by subtracting the City billed sewer flow from the various WWTF flows in Table 3-6. In calculation of wet weather maximum weekly, sustained, and monthly I/I, the average of the three highest values from 2009 to 2014 was used. For the maximum daily I/I, drought year 2012 was excluded and the average of the remaining years was taken. The calculations are provided in Appendix G and the results are summarized below in Table 3-7.

Table 3-7
Existing I/I Values

	I/I Flow (MGD)
Dry Weather Infiltration (Sustained Minimum)	0.031
Wet Weather Infiltration and Inflow	
Maximum Daily	0.501
Maximum Weekly	0.470
Maximum Sustained (2 week)	0.320
Maximum Monthly	0.196
Annual Average	0.094

The average annual City Base Flow over the five year period of evaluation is determined by adding the residential water flow to the average annual I/I amount. For average residential water use of 0.100 MGD (Table 3-5) and an annual average I/I of 0.094 MGD this will equal 77 gallons per capita per day at the current population of 2,525. This falls well under the maximum limit established by the EPA which is 120 gallons per capita per day.

The EPA further defines non-excessive inflow if the maximum daily flow (excluding non-residential contributions) does not exceed 275 gallons per capita per day. Adding the daily residential water use to the maximum daily I/I will result in a flow of 0.601 MGD. The resultant daily inflow calculation is 238 gallons per capita per day, which does not exceed the EPA criteria.

3.5.2 Organic and Suspended Solids Loading

Reference is made to Appendix F, Existing WWTF Flow and Loading Data, for a listing of historical loading values recorded at the treatment facility and for the summary tables used as the basis for the following determinations. Annual average BOD and total suspended solids loadings to the City's facility are provided in Table 3-8 below, along with the average of the three highest months for each year. Calculation of the existing base loading will be done by averaging the three highest months because the facility will have to handle the impact of sustained loads.

Table 3-8
Organic and Solids Loadings to WWTF

	BOD (lbs/day)		TSS (lbs/day)	
	Annual Average	Average 3 Highest Months	Annual Average	Average 3 Highest Months
2009	567	662	394	475
2010	758	917	413	489
2011	585	804	460	515
2012	503	543	447	474
2013	494	532	420	471
2014	497	539	450	556
Average	567	666	431	497
Maximum	758	917	460	556
Average (5 highest values)		**693**		**502**

Since the City has no major industries that must be accounted for, the City Base Loadings to be used in future BOD and TSS projections in Chapter 4 are those in Table 3-8.

3.5.3 Nitrogen and Phosphorus Loadings

Historical loading data for ammonia, total Kjeldahl nitrogen (TKN), and phosphorus does not exist in sufficient quantity to make a reliable determination of existing loading rates. Effluent ammonia and phosphorus are monitored, but influent data are not collected. Therefore, typical concentrations of 40 mg/L TKN and 7.0 mg/L phosphorus, based on normal strength domestic wastewater, will be used for design projections in Chapter 4. These concentrations are, in turn, used in conjunction with established flows to determine the loadings for each sector.

4. FUTURE DESIGN CONDITIONS

4.1 Community Growth

The Wisconsin DOA population projections for the City of Fennimore show a roughly 1.4% total population increase for the City from 2015 to 2035, or 0.07% per year, for a 2035 population of 2,540. As noted in Chapter 3, the DOA population estimate for the City in 2015 is 2,505 and the City's water utility total served population is reported as 2,525 in the 2013 PSC report. A base population of 2,525 is used for this Facilities Planning Document.

The Comprehensive Plan that was adopted by the City in 2003 include low and high projections for a year 2030 population of 2,892 and 3,062, respectively. These low and high growth rates of 0.66% and 0.86% per year were extrapolated to year 2035 for low and high population projections of 2,987 and 3,193, respectively. A linear projection of the growth rate from 2000-2010 (0.4%) was also used to develop a year 2035 projection of 2,772. These three projections are provided in Appendix C and represent a range of growth from 482 to 688 capita over the next 20 years. Based on current knowledge of possible growth, the City Council has decided to use a 2035 projected population of 2,875 for the Facilities Planning Document. It is felt that a 350 capita growth is reasonable based on the Comprehensive Plan projections and is consistent with the City's growth from 2000 to 2010.

Growth in the commercial, industrial, and public authority sectors was projected based on the Comprehensive Plan and input from the City. Future commercial and industrial development is projected to occur mainly within the City's existing industrial park. See Appendix C for additional information.

A summary of these projections is presented below in Table 4-1.

Table 4-1
Year 2035 Growth Projections

Sector	Increase
Residential	350 capita
Commercial	12 acres
Public	0.75%/year
General Industrial	25 acres

4.2 Wastewater Flows

The design flow rates for the City of Fennimore will include the main components listed below:

- Existing City Base Flow
- Future City Increases
- Additional Contributions
- Existing Infiltration and Inflow

The existing City Base flow was determined in Chapter 3. The average gallons per capita or (customer) per day (gpcd) from Table 3-5, Billed Sewer Flow, was used to calculate the current base flow of 0.201 MGD. The average residential usage from Table 3-5 was increased from 40 gpcd to 56 gpcd to allow for some increase in residential usage and to bring the total design flow for the WWTF up to 0.620 MGD, the current design flow. This decision was made so as not to decrease the design rating of the current facility.

Future city increases, including residential, commercial, public and general industrial sectors are based on billed sewer flow averages, typical values, and the expected increases shown in Table 4-1. The future residential increase is based on the population growth shown in Table 4-1 multiplied by a future per capita rate of 60 gpcd. The water usage for future commercial and industrial acreage was estimated to be 1,000 and 1,500 gallons per acre per day, respectively, based on current water usage rates and typical values. Public sector growth was estimated at 0.75% per year applied to the current usage of 13,300 gpd.

Additional contributions come from future potential acceptance of septage and/or holding tank wastewater from outside sources. Currently the WWTF does not accept hauled wastes, but it is expected that the demand for this practice will increase in the future. Local waste haulers and WWTFs were surveyed regarding the amount of hauled waste collected in the region and the need for receiving capacity. Local haulers responded that they would make use of receiving facilities in Fennimore if the rates were favorable. Other WWTF operators also saw the need for increased hauled waste treatment capacity in the region. The results of the survey are summarized in Appendix H. For the future load projections, the hauled waste contributions include 7,500 gallons per day of septage and 5,000 gallons per day of holding tank waste.

Infiltration and inflow quantities are taken from those values previously established in Table 3-7. Sustained wet weather infiltration is used to determine the average design flow because this clear water flow can be sustained for long periods of time which must be accommodated at the treatment facility with regards to system capacity.

The design average flow is calculated by summing the City Base flow, future city increases, industry projections, and the sustained and future additional I/I values. The maximum daily flow value is determined by summing the City Base flow, future city increases, multiplying this sum by a peaking factor of 1.75; and adding this value to the maximum daily inflow value and additional contributions. The peak hourly flow value is similar to the maximum daily flow with the exception that a peaking factor of 2.5 is used along with the peak hourly I/I number (maximum daily I/I multiplied by 3.0). The peak flow values will be reviewed during the design phase, along with historical peak flow data, to ensure that the influent headworks and pumping will adequately handle peak flows. Due to the constraints of the existing influent channel and screen, flooding of the influent channels has occurred during peak flows and it is possible that past peak flows that have not been accurately recorded.

The future flow projection calculations are provided in Appendix I and summarized in Table 4-2.

Table 4-2
Future Flow Projections

Contributor	Quantity	Rate	Design Flow MGD
1. City Base Flow			
Residential	2,525 capita	56 gpcd	0.141
Commercial	126 customers	237 gpcd	0.030
Public	52 customers	265 gpcd	0.014
General Industrial	3 customers	5,300 gpcd	0.016
2. Future City Increases			
Residential	350 capita	60 gpcd	0.021
Commercial	12 acres	1,000 gpad	0.012
Public	0.75%/year	13,300 gpd	0.002
General Industrial	25 acres	1,500 gpad	0.038
3. Future Industry Requests			
Unallocated	None		0
4. Additional Contributors			
Septage Hauling	(See paragraph above)		0.008
Holding Tank Waste			0.005
5. Infiltration and Inflow			
Sustained	(Table 3-7)		0.320
Future Additional	350 capita x 40 gpcd		0.014
Future Reduction	No reductions assumed		0
Maximum Daily Inflow	(Table 3-7)		0.501
Peak Hourly Inflow	(Max Day Inflow x 3.0)		1.503
Annual Average Flow (MGD)			0.394
Design Sustained Flow (MGD)			**0.620**
Maximum Daily Flow (MGD)			1.006
Peak Hourly Flow (MGD)			2.213

4.3 Organic and Suspended Solids Loadings

Historical loading data from 2009 through 2014, as summarized in Table 3-8, were used to establish the current base loadings for BOD and total suspended solids being processed at the WWTF. The averages of the 3 highest months per year, using the five highest yearly averages, were used for the base load. For future residential loads, the population increase is multiplied by a rate of 0.22 pounds of BOD and 0.20 pounds of solids. For the commercial, public, and general industrial the wastewater flow increase is multiplied by assumed concentrations of 250 mg/l for BOD and suspended solids which are typical for municipalities.

Additional contributions from holding tank or septage haulers are based on a total daily flow of 12,500 gpd which includes 7,500 gpd of septage and 5,000 gpd of holding tank waste as described previously. Assumed concentrations of 7,500 and 1,500 mg/L BOD for septage and holding tank respectively, and 10,000 and 1,000 mg/l suspended solids are used to calculate total loadings in pounds per day for each of these contributions. A summary of these projected design future loadings are given in Table 4-3.

Table 4-3
BOD and SS Loading Projections

	BOD (lbs/day)	**SS (lbs/day)**
1. City Base Loading (Table 3-8)		
Annual Average	567	431
Design Sustained	693	502
2. Future City Increases		
Residential	77	70
Commercial	25	25
Public	4	4
General Industrial	78	78
3. Future Industry Requests	0	0
4. Additional Contributions		
Septage	469	626
Holding Waste	63	42
Annual Average Loading (lbs/day)	1,283	1,276
Design Sustained Loading (lbs/day)	**1,409**	**1,347**

4.4 Nutrient Loadings

The same methodology used to project BOD and suspended solids loadings is utilized to calculate future nutrient loadings with the exception that typical values are used for ammonia and phosphorus concentrations due to the lack of sufficient historical data for influent loadings to the facility. For City base loadings, both existing and future, concentrations for TKN and phosphorus are assumed to be 40 mg/l and 7 mg/l respectively (Table 3-9). For additional contributions, concentrations of 400 mg/l and 250 mg/l are assumed for ammonia and phosphorus respectively for septage and 200 mg/l and 17 mg/l for holding tank waste.

These assumed concentrations were multiplied by the flow rates established in Table 4-2 to determine the projected nutrient loadings. A summary of these calculations is given below in Table 4-4.

Table 4-4
Future Nutrient Loadings

	TKN (lbs/day)	P (lbs/day)
1. City Base Loading	67	11.7
2. Future City Increases		
Residential	7	1.2
Commercial	4	0.7
Public	1	0.1
General Industrial	13	2.2
3. Future Industry Requests	24	4.2
4. Additional Contributions		
Septage and Holding Waste	25	15.6
Holding Waste	8	0.7
Design Loading (lbs/day)	125	32

4.5 Future Effluent Limitations

The existing outfall is the only location being considered for future discharge from the WWTF. As part of the facilities planning process, an effluent limit request for the current outfall location was made to the Water Resources Section of the WDNR. Copies of correspondence regarding this issue are included in Appendix J and a summary of the preliminary effluent limits as calculated by the WDNR is given below in Table 4-5.

Table 4-5
Projected WPDES Permit Limits

Parameter	Limits
BOD (monthly average)	15 mg/l
BOD (daily maximum)	30 mg/l
TSS (monthly average)	20 mg/l
TSS (daily maximum)	30 mg/l
Ammonia-N (daily maximum)	11 mg/l
Ammonia-N (weekly average)	8.0 mg/l (Apr 1 – Apr 30) 3.4 mg/l (May 1 – Sep 30)
Ammonia-N (monthly average)	3.3 mg/l (Apr 1 – Apr 30) 1.5 mg/l (May 1 – Sep 30) 5.4 mg/l (Oct 1 – Mar 31)
pH	6.0 – 9.0 s.u.
Phosphorus (monthly average)	0.225 mg/l
Phosphorus (6-month average)	0.075 mg/l
Fecal coliforms	400# / 100 ml
Dissolved Oxygen (daily min)	4.0 mg/l
Chloride (weekly average)	510 mg/l

4.6 Design Summary

A summary of the projected design parameters established in the preceding sections are given in Table 4-6.

Table 4-6
Design Loading Summary

Projected Population	2,878	
Flow Rates (mgd)		
Design Average	0.620	
Maximum Daily	1.006	
Peak Hourly	2.213	
Pollutant Loadings (lbs/day)	With Hauled Waste	Without Hauled Waste
BOD	1,409	878
Suspended Solids	1,347	680
TKN	125	91
Phosphorus	32	16

5. PROJECT ALTERNATIVES

5.1 Overview

As noted in Section 2.1, the purpose of this Facilities Planning Document is to evaluate alternatives for upgrading the City of Fennimore's existing WWTF and for meeting current and future permit requirements, in particular new WQBELs for phosphorus that may require upgrades to the WWTF. It is the City's intent to use a phased approach to address these issues, with the first phase of design and construction to include comprehensive upgrades to meet current and near-term loads and to address the most pressing issues identified for the current processes and equipment.

It should be noted that the projected design loads for the Year 2035 (Table 4-6) include a significant hauled waste component that may or may not be realized. To avoid building excess capacity that may not be needed, the City has opted to maximize existing biological and solids handling capacity for the first phase of construction. It is expected that additional secondary treatment capacity, final clarifiers, and solids handling capacity would be needed to treat the full Year 2035 design load. For the purposes of planning and comparison of options, the design load for Phase 1 of construction is assumed to be the Year 2035 projected loadings without hauled waste (see Table 4-6). Phase 2 of construction is assumed to be an upgrade to address the new phosphorus WQBELs. Phase 3 is a capacity upgrade to accommodate loadings associated with hauled wastes. These upgrade would occur as needed if hauled waste is found to be a significant loading and revenue source.

The need for improved phosphorus removal to meet new permit requirements will be taken into consideration throughout facilities planning and design, but the specific planning and design submittals will follow the phosphorus compliance schedule in the WPDES permit. This document serves as the Facilities Planning Status Report for phosphorus that is required to be submitted by September 30, 2015. Section 5.5 describes phosphorus compliance options that will be evaluated by the City.

This Facilities Planning Document does not evaluate the construction of a new plant because several of the existing tanks and structures are in relatively good condition and are expected to last for at least the next 20 years with the recommended repairs and modifications. The City wishes to maximize the use of existing structures/tankage to the greatest extent possible.

5.2 Summary of Upgrade Requirements

Any upgrade of the existing City of Fennimore WWTF must meet the acknowledged reasons for undertaking facilities planning, including the following:

- Maintain compliance with the existing and future effluent limits.
- Replace process equipment coming to the end of their effective life.
- Address the issues of deteriorating process structures, HVAC system effectiveness, and shortcomings in the electrical distribution system.
- Implement changes which will make the working conditions a safe environment for facility staff.

The specific issues that have been identified for the WWTF are summarized in Section 3.3 and are described in the following sections.

5.3 Description of Plant Upgrade Alternatives

5.3.1 Preliminary Treatment Processes

For the purposes of this report, preliminary treatment will include fine screening, grit removal, influent sampling and flow measurement, and influent pumping. Significant preliminary treatment upgrades are needed, as the influent screen is undersized and the raw sewage pumps and storm pump are aging and inadequate for handling peak flows. Based on the location of the existing infrastructure, re-routing the existing influent flow will be difficult and cost prohibitive. For all alternatives, it will be assumed that the location of the existing influent sewer, influent structure, wet well, and dry well will be maintained.

The WWTF does not currently have grit removal facilities and addition of grit removal equipment in the existing headworks would not be possible. Grit removal is an option if a new headworks is constructed. The following options will be considered for preliminary treatment upgrades.

5.3.1.1 Maintain Existing Headworks

For this option the existing structures would be maintained, the existing screen would be replaced with a higher capacity unit, and the influent pumps would be upgraded to accommodate the projected design flows. The existing flow meter and sampling locations would be maintained.

5.3.1.2 New Headworks

This option would use the existing influent channel for flow measurement and sampling; the existing influent pumps would be upgraded; and a new headworks building would be constructed at the top of the hill next to the blower building for the equalization tank. The new headworks would house a new fine screen, bypass bar rack, and grit removal equipment (optional). Flow from the influent pumps to the existing equalization tank would be re-routed to the new headworks.

5.3.1.3 Conclusions

Construction of a new headworks building will allow for grit removal and will provide better conditions for the operators handling screenings. Retrofitting a larger screen in the existing space will be difficult and will still require that screenings be carried up a flight of stairs for disposal. Costs will be developed for both options, but a new headworks will be assumed for comparison of alternatives. During the design phase, consideration will be given to keeping the exiting headworks despite the known significant deficiencies.

5.3.2 Flow Equalization

For all alternatives, the existing flow equalization tank and stormwater pond will be maintained. The equalization tank will require minor repairs to the piping and mixing system. If the existing headworks is maintained, the splitter structure that directs flow into and out of the equalization tank will need repairs. If a new headworks is built, flow splitting would be accomplished at the new structure. No modifications are assumed to be needed for the stormwater pond, which was resurfaced in 2014.

5.3.3 Primary Clarifiers

The existing primary clarifiers are in good condition. The mechanical components in the south clarifier were replaced in 2014 and the north clarifier equipment is scheduled for replacement in 2015, if needed with the WWTF upgrade. With operational enhancements for scum and sludge pumping, the clarifiers could be maintained for future treatment. The primary clarifiers could be removed if the secondary treatment process is changed to activated sludge and the sludge stabilization process is changed from anaerobic digestion to aerobic digestion.

5.3.4 Secondary Treatment Process

The existing RBCs have reached the end of their useful life and must be replaced. Two main secondary treatment processes are considered viable for the City's facility, as described in the following sections. For all options, secondary treatment will have to be maintained during construction and work will need to be phased.

5.3.4.1 Replace Existing RBCs

The first option is replacement of the existing RBCs with new motor-driven RBCs and construction of additional RBC basins. RBCs consist of parallel media disks mounted on a shaft that is slowly rotated in a tank through which wastewater is passed. The shaft is mounted above the water level, so less than half of the media is submerged at one time. Treatment is provided by the biofilm that attaches to the media. While the basic configuration and design of RBCs has not changed substantially since the original RBCs were installed, manufacturers have made improvements in shaft design and mechanical drives have become the standard rather than air-driven systems similar to the current installation.

To replace the existing RBCs, new RBC basins would be constructed and brought on-line north of the existing RBC basins, then the existing RBCs would be retrofitted. The new RBC system would have aeration for biomass control and 5-hp drives for rotating each of the shafts.

5.3.4.2 New Conventional Activated Sludge System

The second option is the construction of a new activated sludge system. There are various types of activated sludge processes that could be considered, including conventional activated sludge, oxidation ditches, extended aeration, and sequencing batch reactors. For the purposes of simplifying the comparison between these options and retrofitting the existing RBCs, only conventional activated sludge has been considered in this facilities plan. Other variations of the activated sludge process could be considered during the design process if this option is selected.

The new activated sludge basins would be completed first, then the existing RBC basis would be demolished to provide room for future aeration basins, without the need to add temporary treatment during construction.

Alternatives incorporating conventional aeration basins will be designed for a maximum BOD loading rate of 40 pounds per thousand cubic feet of volume (per NR 110) and a food to microorganism ratio of between 0.20 and 0.40. Air supply will be provided to meet an assumed a demand of 1.1 pounds of oxygen for each pound of BOD treated and 4.6 pounds of oxygen for each pound of TKN. Fine bubble diffused aeration would be provided in each basin. Blowers on VFDs and dissolved oxygen instrumentation would be provided to match air supply with influent BOD loadings. A new process building would be required to house aeration blowers, RAS/WAS pumps, and MCCs/VFDs for the new equipment.

5.3.5 Conventional Phosphorus Removal

For the purposes of this study, treatment to meet the current permit limit of 1 mg/L will be considered conventional phosphorus treatment. The two processes commonly used for conventional phosphorus removal are chemical addition of a metallic salt resulting in precipitation/coagulation of phosphorus compounds and biological uptake of soluble phosphorus, which are described in the following sections. The future phosphors WQBELs will require the City to treat to extremely low concentrations of phosphorus that cannot be achieved with conventional chemical addition or biological nutrient removal. Options for meeting the future WQBELs are evaluated in Section 5.5.

5.3.5.1 Chemical Phosphorus Removal

Chemical phosphorus removal utilizes either iron or aluminum salts to create a solid hydroxide floc to which the phosphorus sorbs, subsequently settles, and is removed through solids treatment. The existing treatment system uses addition of alum at multiple feed points for conventional phosphorus removal.

Chemical phosphorus removal is a simple, reliable, and lower capital cost treatment method; but can have a significant operational cost and can result in a significant increase in sludge production. Sludge production increases can be as great as 10 pounds of sludge for every pound of phosphorus removed, and more for advanced tertiary treatment. Chemical removal will typically create between 25% and 35% more sludge than without phosphorus removal.

5.3.5.2 Biological Phosphorus Removal

Biological phosphorus removal is accomplished by creating environments within the activated sludge system to encourage the growth of phosphorus accumulating organisms. These organisms take up a greater amount of phosphorus as compared to heterotrophic organisms typically associated with activated sludge. In general, biological phosphorus removal has a greater capital cost than chemical removal, but does not have the continuous expense of chemicals or as great of an increase in sludge production.

Use of the biological phosphorus removal is reliable if proper conditions exist and can be maintained. These conditions include an adequate BOD/COD source, production of adequate volatile fatty acid (VFA) through proper staging of aerobic and anoxic phases, and competent operational control. The biological phosphorus removal system will typically create 10-15% more sludge than a conventional activated sludge process without phosphorus removal, and is a more sensitive system to operate. In addition, a less stabilized sludge is produced, which requires more digestion with corresponding power cost increases. However, the biological phosphorus removal process produces less sludge than the chemical phosphorus removal process and has lower chemical costs.

The capital costs for biological phosphorus removal include the construction of anoxic and anaerobic selector basins. These selectors will be provided with mechanical submersible mixing; overflow weirs for discharge to succeeding tanks; pipe terminations that minimize the entrainment of air in the detained liquid; and instrumentation that monitors ORP for process control.

5.3.5.3 Conclusions

If conventional activated sludge is the selected secondary treatment alternative, then either chemical or biological phosphorus removal could be used. For the purposes of this study, biological phosphorus removal has been assumed for the activated sludge alternatives, with the installation of selector basins to maximize removal of phosphorus and nitrogen without the use of excessive chemicals. The cost/benefits of biological to chemical phosphorus removal will be compared during the design phase.

The existing chemical feed system could be used for chemical phosphorus removal or maintained for polishing and treatment during upsets. If the RBCs are maintained as the secondary treatment alternative, then chemical phosphorus removal using the existing chemical feed system is assumed.

5.3.6 Final Clarifiers

The two existing final clarifiers are in good condition and were upgraded with new stainless steel equipment less than 10 years ago. Therefore, all alternatives will include maintaining the existing structures and equipment. An additional clarifier would be required if activated sludge is selected as the secondary treatment option because the clarifiers were designed to settle sludge from a fixed film process, which has better settling characteristics than activated sludge.

5.3.7 Filtration

The existing tertiary filters require substantial repairs or replacement due to structural/corrosion issues. If RBCs are maintained as the secondary treatment process, then the filtration is needed as a polishing step to meet current effluent limits, particularly for TSS and phosphorus. For the purposes of this facilities plan, it is assumed that a new filter would be installed that would be capable of meeting future phosphorus WQBELs, as described in Section 5.4. The possibility of rehabilitating the existing filter rather than replacing it would be evaluated during the design phase.

If activated sludge with biological phosphorus removal is selected as the secondary treatment process, no filtration is necessary to meet current effluent limits. Filtration could be added in the future to provide advanced phosphorus removal to meet future WQBELs.

5.3.8 Disinfection, Post Aeration, and Outfall

Disinfection is not required and will not be considered further. The existing cascade aeration structure and outfall will be maintained to meet the dissolved oxygen requirement of 4.0 mg/l.

5.3.9 Sludge Stabilization

Sludge stabilization is performed to yield biosolids suitable for land application and other uses. Biosolids are classified as either Class A or B, based upon how they are managed for three major criteria; namely heavy metal content, pathogen density, and vector (flies, rodents, etc.) attraction reduction. Class A biosolids are suitable for horticultural and home use in landscaping, gardens, and lawns but are more expensive to produce and have higher capital costs for the associated stabilization systems. Class B biosolids are suitable for application to agricultural land, and can also be used in forestry and other non-agricultural settings. Since the City has access to sufficient land for application of Class B biosolids and no financial incentive or driver to produce Class A biosolids, Class A stabilization processes such as lime stabilization will not be considered. Potential alternatives for Class B sludge stabilization include aerobic digestion and anaerobic digestion.

5.3.9.1 Anaerobic Digestion

The existing anaerobic digester has adequate capacity for the first phase of construction and can used regardless of the secondary treatment option selected. However, the digester needs replacement of an inadequate mixer and aging heat exchanger, along with inspection/rehabilitation of the existing structure and cover. In addition, the gas handling equipment should be moved to a new separate room to meet current National Fire Protection Association (NFPA) code requirements for fire and explosion protection.

5.3.9.2 Aerobic Digestion

The existing anaerobic digester could be converted to an aerobic digester if the primary clarifiers are eliminated. Conversion to aerobic digestion will require the installation of an aeration system and blowers to provide air for the digestion process. Air flow rates of 20 cfm per 1000 cubic feet (kcf) will be used to provide adequate mixing and oxygen supply for cell destruction, however this should be evaluated further in the design phase. Aerobic digestion will require more power input than the anaerobic process but will not require fuel for heating.

5.3.9.3 Conclusions

Due to the complexity of operation and the potential safety hazards, anaerobic digestion would typically not be considered for treatment facility of this size, but is retained because the plant currently uses anaerobic digestion and requires stabilization of primary sludge. If conventional activated sludge is the selected secondary treatment alternative, then conversion to aerobic digestion should be considered, along with removal of the primary clarifiers. Either type of digestion would require replacement of the solids handling pumps.

5.3.10 Sludge Thickening and Storage

The current sludge storage tank has adequate capacity for the first phase of construction. In the future, additional storage and/or sludge thickening may be required, depending on the amount of hauled waste that is accepted. The EPA requires wastewater treatment facilities have capacity to store 180 days of sludge on site or have documented agreements for removal of the sludge if the storage available is less.

Sludge thickening can be used to decrease sludge storage and hauling requirements by removing excess water from the waste sludge. Depending on its location in the flow scheme, sludge thickening can also reduce recycle stream loads back to the treatment facility to extend the capacity of the digester. It is expected that sludge thickening would be added in in the third phase of construction if deemed necessary.

5.3.11 Hauled Waste Receiving

The WWTF does not currently have facilities for accepting hauled wastes. As described in Section 4.2, it is expected that hauled wastes could become a significant component of the plant's loading and could be a source of revenue for the City. Installation of basic hauled waste receiving station that includes two tanks and a bar rack is recommended. Screening or other upgrades could be added during subsequent phases of construction if deemed necessary based on the type and quantity of wastes received.

5.3.12 Building Infrastructure

For all alternatives, the existing administration building will renovated to upgrade the existing laboratory and office work space and enlarge the bathroom. To meet current code requirements and improve work conditions, HVAC and electrical improvements will be needed in all existing structures that will be retained for future use. The City also wants to add insulation and heating to existing garage on the WWTF site to provide a heated space for maintenance of sewer utility vehicles and equipment.

The new headworks building would house a screen, vortex grit chamber, and grit washer, along with associated electrical components and controls. Additionally, a new process building will be built if activated sludge treatment is selected. The new process building would house aeration blowers, RAS/WAS pumps, and MCCs/VFDs for the new equipment.

5.3.13 Electrical Power and Instrumentation

Upgrades to the existing power distribution system will include new MCCs and new control instrumentation. The instrumentation requirements will vary depending on which alternative is being evaluated. The administration building will continue to house the emergency generator. If a new process control building is required, then consideration will be given to relocating the power distribution equipment and main MCCs to the new building.

5.4 Alternatives Summary

Based on the options described in Section 5.3, three main Phase 1 alternatives were developed for comparison and further evaluation:

- Alternative 1 includes replacement of the existing RBCs for secondary treatment as well as maintaining the existing primary clarifiers and anaerobic digester.
- Alternative 2 includes construction of a new activated sludge system for secondary treatment while maintaining the existing primary clarifiers and anaerobic digester.
- Alternative 3 includes construction of a new activated sludge system without the existing primary clarifiers and the conversion of the anaerobic digester to aerobic digestion.

Table 5-1 provides a summary of the various components of each alternative. Cost estimates were developed for construction, operation and maintenance of these three main alternatives to provide a means for evaluation in Chapter 6.

Capital costs were also developed for the following items that could be added or deducted from the alternatives described in Table 5-1:

- Deduct for rehabilitating the existing headworks rather than construction of a new headworks.
- Additional cost for sludge thickening upgrades, which would likely be constructed as part of a later phase.
- Additional cost for replacement of the anaerobic digester cover rather than rehabilitation of the existing cover (applies to Alternatives 1 and 2 only).
- Construction of a new heated storage shed/garage rather than insulating/heating the existing structure.

Table 5-1
Alternatives Summary

	Alternative 1 RBCs w/ Anaerobic Digestion	Alternative 2 Activated Sludge w/ Anaerobic Digestion	Alternative 3 Activated Sludge w/ Aerobic Digestion
Headworks	Replace existing with new building including new screen and grit processing.		
Influent Pumping	Maintain existing structure. Replace existing pumps and valves.		
Equalization	Maintain existing structure. Splitter and mixing system upgrades.		
Primary Clarifiers	Maintain. Upgrade sludge pumping and scum removal.	Maintain. Upgrade sludge pumping and scum removal.	Remove or convert to sludge thickening.
Secondary Treatment	Replace existing RBCs with new mechanical drive RBCs. Add third train to increase capacity.	New diffused air activated sludge with biological phosphorus removal. Process control building addition to house blowers and RAS/WAS pumps.	New diffused air activated sludge with biological phosphorus removal. Process control building addition to house blowers and RAS/WAS pumps.
Final Clarifiers	Maintain existing.	Maintain existing. Add third clarifier.	Maintain existing. Add third clarifier.
Tertiary Filtration	Replace existing filter with new disc filter.	If needed, addition would occur in Phase 2. Other compliance options to be considered include trading or adaptive management.	If needed, addition would occur in Phase 2. Other compliance options to be considered include trading or adaptive management.
Sludge Thickening	Addition to occur in Phase 3 to add capacity.		
Digestion	Maintain existing. Replace all mechanicals. New separate room for gas handling equipment. Rehab cover and install new mixing system.	Maintain existing. Replace all mechanicals. New separate room for gas handling equipment. Rehab cover and install new mixing system.	Eliminate existing mechanicals and convert to aerobic digester with blowers, diffusers, and aluminum cover.
Sludge Storage	No changes.		
Hauled Waste Receiving	Hauled waste receiving system to be installed. Upgrades could occur in Phase 3 if needed.		
Existing Control Building	Upgrade lab and electrical. Modify bathroom and storage rooms to include larger bathroom and office space.		

5.5 Phosphorus Compliance Alternatives

According to the planning effluent limits provided by the WDNR (Table 4-5), the Fennimore WWTF will be required to meet a 6-month average effluent limit for total phosphorus of 0.075 mg/l. This effluent limit is significantly lower than the plant's current interim limit of 1 mg/L and will require upgrades to the plant and/or other compliance alternatives. Table 5-2 provides a summary of effluent phosphorus data from 2009 through 2014, with monthly data provided in Appendix K.

Table 5-2
Effluent Phosphorus Data Summary for 2009-2014

Year	Annual Average Effluent Concentration (mg/L)	Annual Average Discharge (lbs/day)
2009	0.77	1.7
2010	0.66	1.7
2011	0.74	1.5
2012	0.70	1.2
2013	0.79	1.6
2014*	0.65	1.3
Average	**0.72**	**1.5**

*2014 Data through Oct 2014 only

As part of facilities planning for compliance with future phosphorus limits, the WDNR requires the City to evaluate the options described in the following sections.

5.5.1 Upgrades to the WWTF

The WWTF currently meets its phosphorus interim effluent limit through chemical addition to multiple points within the plant, combined with tertiary filtration. In order to meet the more stringent limits, chemical addition would need to be increased and/or biological phosphorus removal would need to be added and recycle streams with high phosphorus content such as the sludge storage tank supernatant would need to be minimized or eliminated. Given the extremely low final phosphorus WQBELs of 0.075 mg/L, chemical addition and/or biological phosphorus removal will not be sufficient. It is expected that additional treatment by tertiary filtration (or similar means) in conjunction with chemical coagulation and/or polymer additions may be necessary. Pilot testing at larger facilities has shown that low-level phosphorus effluent concentrations are achievable, though at significant cost, with current filtration technologies. Therefore, the City will proceed with evaluating the following tertiary treatment technologies:

- Conventional granular media filtration: Filtration using sand or anthracite (or a combination of both) has been used for many years for tertiary treatment of wastewater. This type of filter currently provides effluent polishing following the RBCs at the WWTF. Tertiary filtration aided by chemical addition can reduce total phosphorus concentrations in the final effluent to low levels. Chemicals, typically aluminum- or iron-based coagulants and polymer, must be added to wastewater to associate phosphorus with solids that can then be successfully removed through filtration.

- Cloth media disc filtration: Disc filtration is becoming increasingly common as a replacement for traditional shallow bed sand filters. Nominal openings are typically 10 microns; though some units with 5 micron nominal openings are now being produced. Pilot testing at larger facilities has shown these new 5 micron units are capable of achieving low-level effluent phosphorus concentrations, however it is expected that high coagulant doses may be required.

The existing filter at the Fennimore WWTF needs substantial rehabilitation or replacement to be viable option for future use. The existing filter room could accommodate either form of filtration for future phosphorus removal.

5.5.2 Consolidation With Nearby Sewerage System

Currently the Fennimore WWTF treats wastewater from only the City and Township of Fennimore and accepts a very limited amount of hauled waste. The closest communities with sewer systems and WPDES discharge permits are the Stitzer Sanitary District, which is approximately 3 miles away, and the City of Lancaster, the Village of Montfort, the Village of Mt. Hope, and the City of Boscobel, which are 9 to 13 miles away. Because of the current capacity available at Fennimore and Stitzer WWTFs, and the distance to other facilities, it does not appear that regionalization is a viable option and it will not be considered further. As described in Section 2.2, other unsewered communities and townships were also considered for regionalization/possible inclusion in the service area for the WWTF; however, none of these foresee a need for connection in the near future.

5.5.3 Alternative Discharge Locations

The WDNR recommends the consideration of alternative discharge locations that may provide a WWTF with a less stringent phosphorus limit depending upon the receiving water classification and quality of the respective water body. The only possible alternative discharge locations for the Fennimore WWTF would be to other streams in the headwaters of the Upper Grant River, Platte River, Green River, and Blue River watersheds. Relocation of the outfall to another stream in these watersheds would not provide less stringent phosphorus limits.

5.5.4 Watershed Based Approaches

NR 217 allows for alternative compliance means through two watershed based approaches; water quality trading and watershed adaptive management. Both of these options involve working outside of the boundaries of the WWTF (and potentially the municipal limits) to reduce phosphorus discharges to the receiving stream, thereby allowing the WWTF to discharge more phosphorus than would be allowed with the proposed effluent limit of 0.075 mg/L.

5.5.4.1 Water Quality Trading

Water quality trading (WQT) involves working within the watershed of the respective receiving stream to reduce phosphorus runoff at a level commensurate with the required reduction in phosphorus load from the treatment facility to comply with water quality based effluent limits (i.e. an offset). WQT also requires “trade ratios” to be applied to provide certainty that water quality is being improved as a result of WQT. Trade ratios can vary between 1.1 and 5 (or higher) depending upon the type of practice installed, location within the watershed, and type of trade being performed (point to point, point to municipal separate storm sewer systems [MS4], point to nonpoint, etc.).

For the lowest possible trade ratio, trading would need to occur within the WWTF’s HUC12 watershed and upstream of the WWTF outfall. Maps of the HUC 12 watershed are provided in Appendix L. The watershed area upstream of the current WWTF outfall is roughly 0.6 square miles (384 acres) according to WNDR PRESTO results table (Appendix L). However, according to the Long Term Hydrologic Impact Analysis (L-THIA) on-line tool from Purdue University, the total area for this watershed is approximately 990 acres based on the current outfall discharge point. L-THIA output for watershed is provided in Appendix L.

The City will continue to evaluate WQT to determine its cost and environmental effectiveness. Further evaluation will include identifying possible phosphorus load reduction projects within the City of Fennimore as well as making contact with county land and water conservation departments in an attempt to quantify cost and feasibility of agricultural best management practices (BMPs).

5.5.4.2 Watershed Adaptive Management

Watershed adaptive management follows a similar principal to WQT. Both programs target non-point source BMPs to reduce phosphorus runoff into water bodies. These programs differ in their respective means of compliance for the point source. Compliance with WQT is based upon theoretical reductions from BMPs and the actual mass of phosphorus discharged from the WWTF. Compliance with watershed adaptive management is based upon achieving the water quality criterion (0.075 mg/L) in the receiving water at the point of compliance. The permittee is given 20 years to meet the water quality criterion in the receiving water. In addition to achieving compliance within the receiving water the participating facility must also meet interim limits of 0.6 mg/L and 0.5 mg/l during the first and second permit terms of adaptive management, respectively.

A permittee is eligible for adaptive management as long as the following three requirements are met:

- The receiving water is exceeding the applicable phosphorus criteria.
- Nonpoint sources contribute at least 50% of the total phosphorus entering the receiving water.
- Filtration or equivalent technology would be required to meet the proposed/new phosphorus limit.

According to the PRESTO data (Appendix L), the ratio of point source phosphorus load to non-point source load for the receiving water is 65%:35%, which would mean that technically the City does not qualify for Adaptive Management based on the second criterion. The City will continue to evaluate adaptive management to determine if it is feasible alternative and whether the City is eligible for this compliance option.

5.5.5 Water Quality Variance

Wisconsin State Statute 283, paragraph 283.15 allows for variances to water quality standards. Paragraph 283.15 (4) states that a variance may be granted if "attaining water quality standards is not feasible". Likely the most prominent reason for obtaining a variance to water quality standards is "the standard, as applied to the permittee, will cause substantial and widespread adverse social and economic impacts in the area where the permittee is located". Per WDNR guidance, "if the resulting cost of implementing the phosphorus water quality based effluent limits is greater than 2% of the medium household income (MHI), it would generally be concluded that the economic impact is adverse enough to warrant granting of the variance."

The City will evaluate compliance options and compare with their MHI ($45,449 based on 2013 data) to determine if the 2% threshold (equivalent user rate of $76/month) is met and a variance application is feasible.

5.5.6 Statewide Multi-Discharger Phosphorus Variance

In the spring of 2014 the Wisconsin state legislature passed a bill which was then signed by the Governor, effectively granting a statewide variance to water quality based phosphorus limits if a point source discharger can show attainment of the standards is economically infeasible. The Department of Administration (DOA) has reviewed the variance and has determined that the water quality based phosphorus limits do indeed cause adverse economic burden to point source dischargers. Following public comment on the DOA determination, the variance must be approved by the U.S. Environmental Protection Agency. According to recent WDNR publications, the variance is expected to include the following:

- The duration of the variance will be for a maximum of 20 years (4 permit terms).
- Interim limits will be in effect and will subsequently be reduced each permit term. Initial values discussed included a limit of 0.8 mg/L during the first permit term, 0.6 mg/L during the second permit term, 0.5 mg/l during the third permit term, and finally WQBEL compliance.
- Watershed projects to reduce nonpoint source phosphorus are required. The discharger can enter into an agreement with the WDNR to implement a watershed project or can make payments to the county Land Conservation Department (LCD) for implementation of nonpoint source best management practices. The payments are expected to be $50 per pound of phosphorus for the difference between actual phosphorus discharged and 0.2 mg/L.

To be eligible for the variance, the point source discharger must require a major facility upgrade (i.e., addition of tertiary filtration) to comply with their phosphorus WQBELS and must meet primary and secondary indicators of substantial economic impact. The City will continue to monitor the progress of this variance legislation and evaluate participation in the variance if other alternatives are determined to be unacceptable.

5.5.7 Summary of Retained Options

The City will continue to evaluate feasible alternatives for meeting the final phosphorus limits, which may include facility upgrades (filtration), Watershed Adaptive Management, Water Quality Trading, or a water quality standards variance. Consolidation with other facilities and alternative discharge locations will not be considered further. The selected phosphorus compliance option will be described in a Preliminary Compliance Alternatives Plan that will be submitted by September 30, 2016 as an Addendum to this document, with a Final Plan submitted by September 30, 2017. The recommendations for this Facility Planning Document will focus on modifications to the existing treatment plant that will maximize biological treatment and nutrient removal to decrease the amount of phosphorus removal/reduction that will be required by other means.

6. ALTERNATIVES COMPARISON

6.1 General

In this chapter financial and non-economic analyses are presented for the three alternatives described in the previous chapter. The financial analyses will include capital, operation and maintenance and present worth cost evaluations for each alternative. Non-economic evaluations presented will include a qualitative analysis considering such factors as ease of operation, future growth potential, and an environmental assessment. Operation and maintenance costs will be based on the current utility budget for the facility with changes made as appropriate to account for each proposed upgrade. Additions and savings to the budget will be allocated as appropriate to account for changes in energy requirements and materials associated with the process changes described.

A phased approach is planned for the proposed WWTF upgrades, as described in Section 5.1. This chapter presents costs for Phase 1 construction only. Costs for Phase 2 and 3 have not been including in the cost analyses. Section 6.2 also includes capital costs for potential additions or deductions to the alternatives, as described in Section 5.4.

6.2 Capital Costs

Summarized capital costs for each of the Phase 1 alternatives are presented below in Table 6-1, Capital Cost Summary. These costs include changes to the secondary treatment train as well as the other modifications listed in Table 5-1 for other plant processes and structures. A more detailed cost breakout for each of these alternatives and phases is provided in Appendix M. The process models that were used to develop the sizes for structures and equipment are provided in Appendix N.

The capital costs listed in Table 6-1 include costs for the eventual general contractor’s scope of services; a contingency of 10% of the projected contractor’s cost; and engineering, administration and legal work that will be necessary to plan, design, finance and manage the project. The contractor’s scope of services includes construction of the facility modifications with a cost being included for the contractor’s mark up to accommodate overhead and profit, and contract administration. It must be kept in mind that construction and operations costs could change between the date of this facility planning document and the time when the eventual project is bid out.

Table 6-1
Capital Cost Summary – WWTF Phase 1 Alternatives

No.	Construction	Contingency	Engineering, Administration, & Legal	Total
WWTF Phase 1 Alternatives				
1	$7,482,269	$748,227	$1,122,340	$9,352,836
2	$7,254,659	$725,466	$1,088,199	$9,068,323
3	$6,772,341	$677,234	$1,015,851	$8,465,427

For the Phase 1 alternatives the difference in costs between the lowest cost alternative, Alternative 1 and the highest, Alternative 3, is approximately 10.5% of the total, or $887,409. The difference in cost between the alternatives is tied to the secondary treatment process, primary and final clarifiers, tertiary filter, and digester structure. Costs for the remaining structures, including the headworks, influent pumping, equalization tank, waste receiving, lab/control building, and garage are the same for all Phase 1 alternatives.

Table 6-2 presents capital costs for the items that could be added or deducted from the alternatives, as described in Section 5-4:

Table 6-2
Capital Cost Summary – Potential Phase 1 Additions/Deductions

No.	Construction	Contingency, Engineering, Administration, & Legal	Total
Rehab Existing Headworks Deduct	$1,318,291	$329,572	$1,647,864
Sludge Thickening Upgrades Adder	$928,182	$232,045	$1,160,228
Replace Digester Cover Adder	$89,424	$22,356	$111,780
New Garage/Shop Adder	$298,982	$74,745	$373,728

6.3 Operation and Maintenance Costs

Annual O&M costs for each of the Phase 1 alternatives are summarized below in Tables 6-3 and 6-4. The first table includes costs for start-up conditions which are to be expected when the upgraded facility goes into operation in Year 2017, and the second table is for design year conditions which are expected twenty years after that. The City's general budget categories are used for the column headers. The "WWTP" category includes transportation and accounts for all the costs will vary among the various alternatives. The "Collection System" category as well as all the categories combined into "Other", including Accounting and Collections, Administrative and General Expenses, Interest Expenses, and Employee Benefits, will be similar for all alternatives.

Table 6-3
O&M Cost Summary at Start-Up Conditions

No.	WWTP	Collection System	Other	Total
WWTF Phase 1 Alternatives				
1	$233,433	$22,980	$170,614	$427,027
2	$200,716	$22,980	$170,614	$394,310
3	$218,776	$22,980	$170,614	$412,370

Table 6-4
O&M Cost Summary at Design Year Conditions

No.	WWTP	Collection System	Other	Total
WWTF Phase 1 Alternatives				
1	$251,393	$22,980	$170,614	$444,987
2	$212,984	$22,980	$170,614	$406,578
3	$228,993	$22,980	$170,614	$422,587

A detailed breakout of the O&M costs for each of the alternatives is given in the appropriate section of Appendix M, along with other supporting information. The detailed breakout uses the City's budgeted line item format as a template for listing these variations in cost. There are more than twenty different budgeted line items for the City's wastewater utility but there are only a few operating costs that vary among the alternatives. Operating costs that will differ among the Phase 1 alternatives include utilities such as electricity and LP gas consumption; chemicals used for the treatment processes; and sludge hauling.

Electricity use varies among the alternatives primarily due to the number of blowers, mixers, pumps, and RBC drives associated with each alternative as well as building spaces to be heated with electricity. All of the alternatives will have higher electrical costs than the current facility, which has annual electrical bills ranging from $25,000 to $30,000. Current electrical costs are low because the existing RBCs are not motor-driven. The electrical costs for Alternative 1 are much higher because the replacement RBCs would have one 5 horsepower drive per shaft. Alternative 3 has the highest electrical costs due to the addition of blowers for aerobic digestion, but lower costs for LP gas because digester heating is not needed.

The cost of chemicals includes the addition of alum for phosphorus precipitation. These costs are lower for Alternative 2 and 3 compared to Alternative 1 and the current facility because the majority of the phosphorus will be removed biologically and alum will only be used for sidestream treatment and effluent polishing as needed. The alum usage is expected to be lowest for Alternative 3 because less phosphorus will be recycled from the aerobic digestion process than the anaerobic digestion process for Alternative 2. It should be noted that the costs for chemical phosphorus removal are for meeting the current interim limit and do not include removal down to the future WQBEL of 0.075 mg/L.

Each alternative will have varying amounts of sludge production, but the amount of sludge hauling is assumed to be the same for alternatives at two hauling events per year, with the goal of minimal decanting of the sludge storage tank.

6.4 Replacement Costs

Annual replacement costs are summarized for each alternative in Table 6-5. These costs have been separated into the two main categories of process and sludge. The process costs include equipment for the headworks building, biological treatment, clarifiers, septage receiving, and laboratory equipment. The sludge replacement costs include all equipment for sludge processing, digestion and storage.

Individual replacement costs are calculated by considering the present day installed cost of the equipment and determining the annual contribution necessary to replace the item after an assumed equipment life. The annual cost is calculated assuming the same interest rate as that assumed for the present worth analysis provided later in this chapter. Projected inflation values have not been factored into the equipment costs which would increase the higher replacement costs at a greater net amount than the lower replacement costs. Detailed spreadsheets showing the replacement cost values for each of the equipment items for each alternative are presented along with the other cost information in Appendix M of this report.

Table 6-5
Annual Replacement Cost Summary

No.	Process	Sludge	Admin/Elec	Total
WWTF Phase 1 Alternatives				
1	$98,837	$16,795	$29,080	$144,712
2	$47,378	$16,795	$29,080	$93,253
3	$43,518	$8,519	$29,080	$81,117

The replacement costs are highest for Alternative 1 due to the costs for media replacement for the RBCs, which is nearly $1.2 million. The main difference in costs between Alternatives 2 and 3 are due to the equipment replacement costs for the primary clarifiers and the digester.

6.5 Present Worth Analysis

A present-worth analysis is performed for each alternative by taking the capital cost and adding to it the present worth value of the average annual O&M costs and the annual replacement fund cost calculated over the evaluation period of twenty years. The capital, O&M, replacement are as outlined in the previous paragraphs of this chapter. Salvage costs are assumed to be the same for all alternatives and have not been including in the present worth calculations. The discount rate used for this analysis is 4.625%, the rate for Federal Fiscal Year 2015. A summary of the present-worth values is presented below in Table 6-6.

Table 6-6
Present Worth Values of Alternatives

No.	Capital	Average O&M	Replacement	PW
WWTF Phase 1 Alternatives				
1	$9,352,836	$436,007	$144,712	$16,825,700
2	$9,068,323	$400,444	$93,253	$15,421,400
3	$8,465,427	$417,479	$81,117	$14,881,500

The present-worth values range from approximately $14.9 million for Alternative 3 up to approximately $16.8 million for Alternative 1. According to WDNR guidance, alternative present worth costs within 10 percent of each other are considered essentially equal. The alternatives are within 12% of each other.

6.6 Non-Economic Considerations

In this section, an attempt is made to evaluate the three Phase 1 alternatives based on qualitative factors which have been identified as being important by

City staff and council. Table 6-7 provides a summary of the subjective rating for these qualitative factors. The maximum value used for each category is shown and each alternative is scored against this value, with the highest value being the best score and the lowest being the worst. The benefit of performing a qualitative evaluation such as this should be to identify the strengths of certain alternatives that may not necessarily impact a quantitative cost analysis. Additional environmental impacts related to the facility construction are evaluated in Chapter 7 and are not included in this section.

Table 6-7
Qualitative Evaluation Summary

Category	Max Value	Alternative 1	Alternative 2	Alternative 3
Site				
Utilization of Existing Structures	3	3	2	1
Future Expansion Capabilities	5	2	5	4
Operations				
Flexibility	10	3	9	10
Ease	10	6	8	10
Safety	10	4	5	9
Energy Efficiency	10	7	10	5
Sludge Production	5	5	4	3
Noise	5	5	4	2
Air Quality	5	4	4	5
Effluent Limitations				
Phosphorus	15	10	8	15
Ultra_Low Phosphorus	5	5	3	4
Future Nitrogen	10	0	9	10
Total	**93**	**54**	**71**	**78**

Alternative 1 is rated highest for utilization of existing structures because it makes use of the most existing structures, with the RBC basins, primary clarifiers, and anaerobic digester all maintained.

Future expansion relates to the ability to add structures and technology for future upgrades. Future facility expansion will be most easily accommodated by Alternative 2 because it leaves the most room for additional aeration basins and has better utilization of the existing digester capacity.

Operational concerns include flexibility and ease of operation as well as safety for City staff. The activated sludge options (Alternatives 2 and 3) are considered more flexible than the RBC option, Alternative 1, because basins can be easily taken on- or off-line as needed and aeration can be adjusted to meet changing demands. While RBCs are generally easy to operate, the maintenance issues that have been experienced with the existing units make these a less desirable option. Alternative 3 is expected to be the easiest to operate because aerobic digestion is simpler than anaerobic digestion.

The primary safety concerns with regards to work environment have to do with handling and application of potentially hazardous materials; operation of machinery; and minimizing room air issues. Hazardous materials that may be used at the plant include phosphorus precipitating chemicals such as alum; polymers for thickening and dewatering; and cleaning solutions. Also, alternatives with more machinery that have to be routinely maintained are considered a greater safety hazard. Alternative 1 will rely primarily on chemical addition for phosphorus removal and is therefore rated lower than Alternative 2 and 3. Alternatives 1 and 2 are rated lower than Alternative 3 because the anaerobic digester equipment and digester gas handling presents a greater hazard than the aerobic digestion option.

Alternative 2 is the highest rated option with regards to energy efficiency, based on estimated energy usage for each alternative. Alternative 1 has significant energy demands due to the RBC drives and aeration required for the secondary treatment process. Alternative 3 has the highest projected energy costs due to the aeration requirements for both the secondary treatment aeration basins and the aerobic digester.

Sludge production is expected to be lowest for Alternative 1 due to the use of a fixed-film process rather than suspended-growth process. Alternative 3 is expected to produce the greatest sludge quantities and sludge that is more difficult to thicken.

Noise from plant operations is expected to increase with the addition of aeration blowers for Alternative 2 and 3, with Alternative 3 having the greatest aeration demands. However, newer models of blowers are more efficient and significantly quieter than the current blowers.

Air quality issues include odor control and corrosion as they impact room air conditions within the treatment facility, and migration of these odors to commercial and residential areas. Air quality issues, specifically odor control, are expected to be similar for all of the alternatives, but less of a concern for aerobic digestion (Alternative 3) than anaerobic digestion (Alternatives 1 and 2).

The ability to comply with existing and future effluent limits includes incorporating treatment technology that will be easy to operate and will be easily modified to meet future nutrient requirements. All of the alternatives should be able to accommodate current permit requirements. In terms of conventional phosphorus removal, Alternative 3 is expected to achieve the most biological phosphorus removal and require the least amount of chemical addition to meet current permit limits. Because Alternative 1 includes tertiary filtration, it has the highest rating for meeting future ultra-low phosphorus WQBELs. Pilot testing would be required to confirm that the proposed filters would indeed be capable of meeting these limits. If total nitrogen limits are imposed, the activated sludge options can be easily configured to meet these limits while the RBC option cannot.

6.7 Recommendations

For Phase 1 modifications at the WWTF, Alternative 3 is recommended. This option has the lowest capital costs and lowest present worth cost among the three alternatives considered. Additionally, it provides the most flexibility for operations and meeting current and future nutrient limits. The annual operating expenses for this alternative are expected to be less than Alternative 1 but higher than Alterative 2 due to aeration demands. The present worth comparison (Table 6-6) shows a 12 percent difference between the recommended alternative and the highest cost option, Alternative 1.

A summary of the recommendations proposed for the first phase of construction are as follows:

- Replacement of the influent pumps and associated valves
- Construction of a new headworks building housing screening, grit removal, and flow splitting between the equalization tank and forward flow through the plant
- Upgrade of mixing in equalization tank
- Removal of the primary clarifiers or possible reuse as sludge thickeners
- Construction of selector basins and activated sludge basins with diffused aeration for secondary treatment
- Addition of a third final clarifier
- Construction of a process building to house aeration blowers, RAS and WAS pumps
- Addition of a new receiving station for hauled waste (holding tank and septage), with flexibility to feed to the front of the plant and the digester
- Conversion of the anaerobic digester to aerobic digestion with blowers, diffusers, and aluminum cover
- Modifications to the Control Building, including laboratory, office space, and bathroom improvements
- Replacement of aging/obsolete electrical controls and original MCCs.

These improvements are recommended for Phase 1 of construction at the treatment plant, which is expected to begin in 2016 or 2017 depending on funding sources.

Subsequent phases of construction, designated as Phase 2 and 3, will depend on the selected alternative for phosphorus compliance, the actual growth in the City of Fennimore, and future changes to the plant flows and loadings, such as the addition of major industry or acceptance of hauled waste. Phase 2 may include construction of a new filtration system for phosphorus removal, but other phosphorus compliance alternatives will be explored, as described in Section 5.5.

Phase 3 is assumed to include addition of sludge thickening facilities to extend the capacity of existing digester and sludge storage as well as additional secondary treatment capacity, as needed. If actual growth is slower than projected or if hauled waste does not become a significant portion of the influent load, the addition of capacity for Phase 3 may not be needed in the next 20 years.

7. ENVIRONMENTAL IMPACTS

7.1 Project Identification

This chapter provides an analysis of the environmental impacts for the recommended upgrades to the City of Fennimore's existing WWTF.

7.2 Affected Environment

7.2.1 Land Use

No new land will be required for the proposed upgrades at the existing WWTF. The land immediately adjacent to the existing WWTF is currently used for agricultural purposes. There is a farmstead on the other side of Highway 61 from the WWTF site as well as a several other farmsteads within a mile of the WWTF site. However, it is estimated this project will have minimal impact to surrounding homes, as the current site is isolated from adjacent residences by farmland.

7.2.2 Soils

The soils at the existing WWTF site were examined by consulting the United States Department of Agriculture Natural Resources Conservation Service (NRCS) soil maps. The custom NRCS soils report indicates that the soils on the current WWTF site are primarily Arenzville, Sogn, and Dubuque silt loams, with small portions of Dodgeville, New Glarus, and Judson silt loams on slopes ranging from 2% to 20%. Of these soils, Arenzville silt loam can be considered a hydric soil that occurs in depressions, drainageways and floodplains. Refer to the NRCS report provided in Appendix B.

7.2.3 Important Farmland, Prime Forest Land, and Prime Rangeland

The Farmland Protection Policy Act (FPPA), the USDA regulation implementing the FPPA (7 CFR Part 658), and USDA Departmental Regulation No. 9500-3, "Land Use Policy", provide protection for important farmland and prime rangeland and forest land. As the proposed modifications to the WWTF will take place on the existing site, they will not result in the conversion of prime farmland areas.

The Department of Agriculture, Trade and Consumer Protection (DATCP) must be notified of any project which may involve the acquisition of an interest in land from a farm operation through the use of eminent domain procedures (condemnation). The DATCP should be notified of such a project regardless of whether the proposing agency actually intends to use these powers in the acquisition of rights to proposed project lands. If a proposed project involves the actual or potential exercise of the powers of eminent domain in the acquisition of an interest in more than five acres of land from anyone farm operation, the DATCP is required to prepare an agricultural impact statement (AIS) which describes and analyzes the potential effects of the project on farm operations and agricultural resources. If a proposed project involves five acres or less from any one farm operation, an AIS may be prepared at the DATCP's discretion. According to these guidelines from DATCP, an AIS will not be required for this project since no land will be acquired for the WWTF upgrades.

7.2.4 Formerly Classified Lands

There are certain properties that are either administered by Federal, State, or local agencies or have been accorded special protection through formal legislative designations. For the purposes of this report, these properties have been designated “formally classified lands.” Examples include wild and scenic rivers, forestlands, scenic trails, national and state parks, and wildlife refuges. Visual impacts to formally classified land from proposed projects need to be considered as appropriate.

There are no known formally classified lands that will be affected by this project.

7.2.5 Floodplains

There are no known floodplains near the WWTF site, as the area is in non-printed flood map area for FEMA flood mapping service, and the nearest mapped floodplains are over 6 miles away. While the NRCS soil report (Appendix B) indicates that there may be alluvial soil on the site, the site is not known to lie within the100-year flood plain delineation and the existing structures have not been recorded to have flooded.

7.2.6 Wetlands

Based on a review of available resources, including the WDNR Surface Water Data Viewer and wetland inventory, there are not wetlands at the existing WWTF site. Refer to the wetland inventory figure in Appendix O.

If wetlands are determined to be present during the design phase, appropriate permits will be applied for and obtained from the relevant regulating agencies, and strict adherence to the conditions of any permit will be required during construction. Any disturbed wetlands will be restored to pre-existing conditions, and therefore the long-term impacts to any wetlands are expected to be minimal.

7.2.7 Cultural Resources

The National Historic Preservation Act (NHPA) of 1966, as amended, and the Advisory Council on Historic Preservation's (ACHP) implementing regulations, 36 CFR Part 800 (Section 106 regulations), requires Federal agencies to take into account the effect their actions may have on historic properties that are within the proposed project's area of potential effect. To avoid harm to both known historic properties and archeological sites, and to undiscovered sites present in a project area, historic and archaeological sites within or near the project area must be identified, and the effects of the project on these sites must be assessed. A listing of all Wisconsin properties on the National and State Registers of Historic Places contains only one entry within the City of Fennimore and none within the immediate vicinity the WWTF site. Since construction will take place only in previously disturbed locations, no impact to historic properties and archeological sites is anticipated.

7.2.8 Biological Resources

Throughout the United States there are many plant and animal species that are threatened with extinction or exist in greatly reduced numbers partly as a result of human activities. The Endangered Species Act (ESA) of 1973 establishes a national program for the conservation and protection of threatened and endangered species of plants and animals and the preservation of habitats upon which they depend. Under Section 7 of the ESA, Federal agencies are required to consult with the United States Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service for all threatened and endangered species. The consultation is to ensure that the proposed project does not jeopardize the continued existence of any federally-listed threatened or endangered species or result in the destruction or adverse modification of a critical habitat.

State agencies should also be contacted for information on State-listed species and concerns. In some instances, the State may have more detailed information on federally-listed or proposed species and/or critical habitat than the USFWS. Other biological resources which may be impacted by the project include fish and wildlife and vegetation.

Pursuant to these requirements, an Endangered Resources Preliminary Assessment was performed for the WWTF site using the WDNR Natural Heritage Inventory (NHI) Public Portal. According to this assessment, no endangered resources have been recorded for this area and no further action is required or recommended. The Preliminary Assessment is provided in Appendix O.

There are eight Federally-listed threatened and endangered species and one "non-essential experimental population" species listed for Grant County. A review of these species was conducted in accordance with USFWS guidelines and it was concluded that there is no critical habitat in the vicinity of the project and there will be no impact to these species by the proposed project. According to USFWS guidelines, agency concurrence is not required for no effect determinations, but the review was submitted to USFWS for record-keeping purposes and is provided in Appendix O.

7.2.9 Miscellaneous Impacts

7.2.9.1 Operational Impacts

Operational impacts for the upgraded WWTF are expected to be similar to current impacts. During operation the impact to traffic will be minimal, except when disposing of sludge in the spring and fall. The installation of new aeration blowers may increase noise impacts from the existing facility; however, it is expected that the new blowers will be significantly quieter than the current blowers. Section 6.6 addresses other health and environmental impacts related to operation of the plant.

7.2.9.2 Construction Impacts

Modifications to the WWTF will have temporary impacts due to construction. These temporary impacts will include the increase of traffic and noise around the construction site and disturbance of dust and dirt during construction. Traffic along routes to the site will increase during construction.

Because the location of the site is outside of residential and commercial areas, this will minimize the impacts of construction. Construction impacts will be mitigated as described in Section 7.3.

The proposed modifications to WWTF will not have significant negative impacts on land use in the area and will improve the quality of effluent discharged to the receiving stream. Any improvement in effluent quality will have a positive influence on fishery resources.

If high groundwater conditions necessitate the use of high capacity wells (in excess of 70 gpm) for the dewatering, then the environmental impact will be evaluated by the WDNR's Bureau of Water Supply prior to installation of the wells.

7.2.9.3 Secondary Impacts

The construction or upgrade of any WWTF may potentially encourage urbanization by making increased wastewater collection and treatment capacity available. By using foresight and careful planning, the City can successfully defend against unwanted urbanization.

7.3 Mitigative Measures

Primary impacts regarding operational and agricultural concerns will be minimal and do not require mitigative measures; likewise, secondary impacts regarding urbanization concerns will be minimal as well. Mitigative measures for temporary impacts during construction are described in the following sections.

7.3.1 Construction, Temporary Controls

Temporary impacts during construction will be mitigated. Temporary traffic control barricades, signs, flagmen and detours will be implemented as necessary and in accordance with WisDOT standards. If conditions warrant control of dust then a combination of water, calcium chloride suppressant and other dust control measures in compliance with industry standard will be applied.

Erosion control and shoreline stabilization during and following construction are other important considerations during construction. The WDNR has stressed the importance of implementing and maintaining proper erosion control measures. If necessary, any disturbed river banks will be rip-rapped, seeded and mulched within 24 hours of completion. Any steep areas that will be disturbed and that would affect downstream river banks or wetlands will be stabilized with erosion control matting in accordance with WDNR guidelines. Erosion control requirements will be defined during design and in coordination with WDNR chapter 30, Notice of Intent and Corp of Engineers CFR 404 permitting.

7.3.2 Archaeological

If any undiscovered archeological sites or human remains are encountered in the course of investigations at the project area or during construction, the work will have to stop immediately and the Historic Preservations Division consulted.

7.3.3 Endangered Species

No impacts to endangered species are expected, as construction will take place only on the existing WWTF site.

The netting of erosion control matting can easily entrap snakes which are anticipated to be prevalent on the site. To mitigate this impact erosion mat with biodegradable netting and with independently moveable strands meeting WDNR guidelines will be used.

7.3.4 Wetlands

There are no known wetlands at the existing WWTF site. If wetlands are identified during the design phase, appropriate permits will be applied for and obtained from the relevant regulating agencies (in particular Corps of Engineers CFR 404 permit and WDNR Chapter 30 permit), and strict adherence to the conditions of any permit will be required. Any disturbed wetlands will be restored to pre-existing conditions, and therefore the long-term impacts to any wetlands are expected to be minimal.

7.4 Alternatives to the Proposed Action

The alternatives for modifications to the WWTF are presented in Section 5.4. All of these alternatives require construction at the existing plant site and are considered equal in terms of environmental impacts. Cost comparisons of the alternatives are provided in Chapter 6 and in Appendix M. For health and environmental comparisons refer to Section 6.6.

8. FINANCES AND FUNDING

8.1 Parallel Cost Percentage

Reference is made to NR 162 of the Wisconsin Administrative Code and the WDNR web page guidance for the basis of calculating parallel cost percentages. The parallel cost percentage (PC) is calculated to determine that portion of the proposed total project cost eligible for below-market rate financing through the Clean Water Fund (CWF).

As stated in Section 5.1, Phase 1 of the WWTP upgrades will be designed to treat the Year 2035 projected loadings without hauled waste, with additional capacity to be added in Phase 3, if needed, based on City growth and demand for hauled waste treatment. Therefore the Design Capacity (DC) used for the PC calculations is the projected design load without hauled waste presented in Table 4-6. The DC was the basis for the Phase 1 project costs developed in Chapter 6.

In order to calculate the value for PC, revised loading conditions are determined which reduce the total design loadings by those amounts associated with unsewered areas that are not currently connected to the sanitary system; the reserve capacity for loadings which will be realized beyond ten years from the project completion date; and for current and future flows from industrial wastewater users.

An estimate has been made of those projected contributions from residential, commercial, and additional contributions which will not be realized until beyond ten years after the completion of the project. The future loadings described in Chapter 4 have been assumed to be added in a straight line projection over the course of the design period of twenty years. One-half of these future loads will not be included in the revised loading conditions. All loadings from industrial users have also been excluded for the revised loading conditions. A summary of the revised loadings with comparison to the total design capacity is given below in Table 8-1. The column heading “DC” is used by the WDNR to indicate total design capacity, and “RC” is used for reduced capacity. For a more detailed examination of these loading projections, refer to Appendix P.

Table 8-1
Reduced Loading Conditions for PC Calculation

Parameter	Units	DC	RC
Design Flow	MGD	0.620	0.530
BOD	lbs/day	878	691
TS	lbs/day	680	512
TKN	lbs/day	91	68
Phosphorus	lbs/day	16	12

The current flow from the main industrial sector represents approximately 8% of estimated base flow to the plant; therefore, current flows and loads for the RC condition have been reduced accordingly. Also, half of the future residential and commercial loads has been excluded. Since the DC condition for Phase 1 does not include hauled wastes, there is also no hauled waste in the RC condition.

The peak hourly flow value (the basis for design of the forward flow hydraulics) is not significantly lower for the reduced condition. From the loading data found in Appendix P, the peak hourly flow value for the RC condition is 2.023 MGD compared to 2.201 MGD for the DC condition. The relatively insignificant difference in flow values can be attributed to the large amount of clear water entering into the collection system.

The reduced loading conditions are then used to determine what changes would result in terms of structure sizing and equipment selection. Alternative 3 has been used as the basis for determining the impacts to the design for the project. Similar effects would be realized if other alternatives were evaluated.

A portion of the construction proposed for Phase 1 is modifications to existing structures and replacement of existing equipment, which will not be impacted by reduced loading conditions. The design for the influent pumps and new headworks building are governed by the peak hourly flow and would not be significantly reduced for the RC condition. Phase 1 also includes modifications to the existing equalization tank and Control Building/lab, which will not be affected by the reduced loadings. Although sludge production will be reduced for the RC condition, the existing digester will be used for conversion to aerobic digestion. Therefore, the RC condition will not result in any change to the digester sizing, but will reduce the size of the solids handling pumps and aeration blowers.

Phase 1 includes the construction of a new secondary treatment system, which consist of selector basins and activated sludge basins with diffused aeration for

Alternative 3, the recommended alternative. These basins will be designed to meet the DC condition, rather than the full design load projected for the plant by Year 2035. If additional capacity is needed in the future, it will be added as part of Phase 3, which may not occur for more than 10 years. The basin sizes would be slightly smaller for the RC condition. The change in selector basins sizing is insignificant relative to the overall costs but the costs for the aeration basins and diffusers have been reduced accordingly for the RC condition.

Phase 1 also includes construction of a process building to house aeration blowers, RAS and WAS pumps. While the size of the building will remain unchanged for the RC condition, the equipment sizes could be slightly reduced for the RC condition. A third clarifier of equal size to the existing clarifiers would be needed for both the DC and RC conditions.

The only other new structure proposed for Phase 1 is a hauled waste receiving station. While the DC condition does not include hauled waste loading, the City has opted to install a waste receiving station as part of Phase 1 and to add capacity in the future if accepting hauled waste proves to be economically beneficial. Preliminary sizing for the hauled waste receiving station has been based on the typical capacity of septage hauling trucks and the capacity of the hauled waste receiving station would remain unchanged for the RC condition.

Using the design changes described above, a modified cost estimate is developed based on the original cost estimate for Alternative 3, provided in Appendix P. A summary of the original and revised costs are given below in Table 8-3.

Table 8-3
Project Costs for PC Calculation

Item		DC Cost	RC Cost
1	Site Work	$156,580	$156,580
2	New Headworks w/ Grit Removal	$1,160,300	$1,160,300
3	Influent Pumping	$240,580	$240,580
4	Equalization Tank	$48,250	$48,250
5	Primary Clarifiers - Demolition	$31,000	$31,000
6	Splitter/Selectors	$411,510	$411,510
7	Secondary Treatment – Demo/New Basins	$897,400	$792,827
8	Process Building (Blowers/RAS/WAS)	$828,890	$812,690
9	Chemical Feed	$67,900	$67,900
10	Final Clarifiers - Addition of 3rd Clarifier	$411,480	$411,480
11	Tertiary Filtration - Demolition	$60,920	$60,920
12	Solids Handling/Thickening	$0	$0
13	Digester - Conversion to Aerobic	$370,065	$370,065
14	Sludge Storage	$0	$0
15	Waste Receiving Station	$293,115	$293,115
16	Lab/Controls Building	$170,638	$170,638
17	Garage - Upgrade Existing	$76,944	$76,944
Electrical and Instrumentation		$1,045,114	$1,020,960
Contractor Costs		$501,655	$490,061
Contingencies		$677,234	$661,582
Engineering/Admin		$1,015,851	$992,373
Total Phase 1 Project Cost		**$8,465,427**	**$8,269,774**

The parallel cost percentage is then calculated by dividing the reduced capacity cost by the total design cost as shown below:

PC = RC/DC = $8,269,774/$8,465,427 = 97.7%

8.2 Septage Percentage

Reference is made to the resource paper entitled “Wisconsin DNR Program for Septage Considerations in Municipal Wastewater Facility Planning and for Application of Zero Percent Clean Water Fund Loans” dated June 7, 2006 and revised August 2012. The septage percentage (SP) is calculated to determine what portion of the below market rate financing through the Clean Water Fund program will be eligible for zero rate financing.

Separate revised loading conditions are determined which reduce the previously revised design loadings developed in Section 8.1 and labeled as RC. This second revised loading condition, labeled RC2, will be that loading associated without unsewered areas, reserve capacity expected beyond 10 years from the project completion date, industrial contributions, and without any septage loadings. A summary of the revised loadings (RC2) with comparison to the total design capacity (DC) and revised loadings (RC) is given below in Table 8-4. For a more detailed examination of these loading projections, refer to Appendix P.

Table 8-4
Reduced Loading Conditions for SP Calculation

Parameter	Units	DC	RC	RC2
Design Flow	MGD	0.620	0.530	0.530
BOD	lbs/day	878	691	691
TS	lbs/day	680	512	512
TKN	lbs/day	91	68	68
Phosphorus	lbs/day	16	12	12

Since there is no hauled waste in the DC, there is no difference in loading conditions between the revised loadings for the parallel cost ratio (RC) and that for the septage percentage (RC2). Therefore, there is no difference in sizing and for the new secondary treatment structures and equipment between RC and RC2. As explained in Section 8.1, the remaining Phase 1 costs are for modifications to existing structures and replacement of existing equipment, which will not be impacted by reduced loading conditions.

The only difference in cost between RC and RC2 is the cost of the hauled waste receiving station. If the capability for receiving and treating holding tank and septage are removed from Phase 1, then a new hauled waste receiving station would not be needed.

Alternative 3 has been used as the basis for determining the cost impacts for the project. Similar effects would be realized if other alternatives were evaluated. A modified cost estimate for RC2 was developed by removing the cost of the hauled waste receiving station from the RC estimate. A summary of the original and revised costs are given below in Table 8-6.

Table 8-6
Cost Impacts for SP Calculation

Item		DC Cost	RC Cost	RC2 Cost
1	Site Work	$156,580	$156,580	$156,580
2	New Headworks w/ Grit Removal	$1,160,300	$1,160,300	$1,160,300
3	Influent Pumping	$240,580	$240,580	$240,580
4	Equalization Tank	$48,250	$48,250	$48,250
5	Primary Clarifiers - Demolition	$31,000	$31,000	$31,000
6	Splitter/Selectors	$411,510	$411,510	$411,510
7	Secondary Treatment – Demo/New Basins	$897,400	$792,827	$792,827
8	Process Building (Blowers/RAS/WAS)	$828,890	$812,690	$812,690
9	Chemical Feed	$67,900	$67,900	$67,900
10	Final Clarifiers - Addition of 3rd Clarifier	$411,480	$411,480	$411,480
11	Tertiary Filtration - Demolition	$60,920	$60,920	$60,920
12	Solids Handling/Thickening	$0	$0	$0
13	Digester - Conversion to Aerobic	$370,065	$370,065	$370,065
14	Sludge Storage	$0	$0	$0
15	Waste Receiving Station	$293,115	$293,115	$293,115
16	Lab/Controls Building	$170,638	$170,638	$170,638
17	Garage - Upgrade Existing	$76,944	$76,944	$76,944
Electrical and Instrumentation		$1,045,114	$1,020,960	$1,020,960
Contractor Costs		$501,655	$490,061	$490,061
Contingencies		$677,234	$661,582	$661,582
Engineering/Admin		$1,015,851	$992,373	$992,373
Total Phase 1 Project Cost		**$8,465,427**	**$8,269,774**	**$7,794,927**

The septage percentage is then calculated by dividing the difference between the cost associated with RC and the cost associated with RC2 (RC – RC2) by the total design cost (DC) as shown below:

SP = (RC – RC2)/DC = ($8,269,774 - $7,794,927)/$8,465,427 = 5.6%

Therefore 5.6% of the cost eligible for below market rate financing through the Clean Water Fund will be eligible for zero percent financing.

8.3 Financial Considerations

The City of Fennimore sewer utility does not come under the jurisdiction of the Public Service Commission. The number of sewer users can be best estimated by using data from the current sewer user charge system. Table 8-7 presents a summary of the total number of meters, as of 2014, as well as the equivalent meters based on AWWA volumetric equivalents. The existing user charge system as of 2014 has a fixed charge of $15.32 for the smallest (residential) meter size and a flow charge of $4.83 per 1,000 gallons, which equals about $30 per month for 3,071 gallons of water per month for the average residential user.

Table 8-7
Accounts and Equivalent Meters for 2014

	Meter Count	Equivalent Meters
Residential	985	985
Commercial	131	215.5
Industrial	3	34
Public Authority	63	191.5
Totals	1,182	1,426

8.4 Revenue Sources

Wisconsin Statutes empowers a City to construct, maintain, and expand a wastewater system, and further, to collect the revenues to support such a system. There are five potential sources of revenue available to the City for support of the wastewater treatment facilities. They are as follows: (1) special assessments, (2) general fund revenues, (3) impact fees, (4) TIF fees and (5) service charges.

8.4.1 Special Assessments

The levy of special assessments is provided for by Section 66.07 of the Wisconsin Statutes. Generally the special assessment principle is used primarily to recover the costs of services and facilities provided immediately adjacent to the property assessed. One additional use of the special assessment provision employed elsewhere from time to time is that of directly assessing the cost of major capital improvements. This is generally utilized in cases where no service charges are made but the governing body wishes to recover the cost of the improvements. It is more applicable to the financing of a collection system than to the treatment plant itself.

If the City were to provide the proposed wastewater treatment facilities as a general service, it would be possible to assess the costs of the improvement to the benefited parties. However, the City would not be able to do so unless the proper legal procedures were followed and the assessment did not exceed the benefit received by the property assessed. Because of the difficulty in determining the differences in benefits between users and user classes and because of the magnitude of this assessment to present property owners, only, special assessments are not recommended for this project.

8.4.2 General Fund Allocations

General Fund monies from general taxation sources and other routine sources of City income can be used to pay for the subject project. A direct tax levy to recover the costs of this project which are not funded by grants-in-aids is possible. The use of general fund monies on a debt service basis is a potential method of financing. This would be accomplished through issuance of general obligation bonds (to be discussed in later section). Generally this method of financing is reserved for street improvements, administration improvements and not for wastewater treatment facilities. This method of financing will not be used for this utility project.

8.4.3 Impact Fees

Wisconsin Statute 66.0617 allows cities, villages, towns, and counties to assess impact fees on developers to offset the capital costs for public facilities needed as a result of the new development. The law requires municipalities that wish to utilize the connection fee or connection charge concepts to base these fees on sound concepts. The City has the option to implement an impact fee to assist in paying for improvements that are a result of development. These fees cannot be used to finance deficiencies of any system but for replacement of systems that will not have adequate capacity to meet new user demands. Any implementation of impact fees will require a needs report (this document will meet that requirement), breakout of costs to present and future users, an ordinance regulating the fees, development of an accounting system to segregate the fees and a public hearing on the ordinance. The City can utilize this system and may want to seriously consider this method. This method will not be used at this time for calculating the user charge rates. It should be noted that the same bond types can be used in conjunction with this system.

8.4.4 Tax Increment Finance District (TIF)

The City has the option to develop or utilize some of the existing tax increment finances districts to include the WWTF to assist in financing this project. To utilize this approach, the City would have to identify some specific boundaries of land that is mostly undeveloped but is anticipated to be developed in the near future. The percentage of cost of this treatment facility that is related to the potential development of this area included in the TIF district can be paid by the increment of the TIF district. The tax increment is the amount of tax money collected between the value of district at the time of formation to value of the property after development. This tax increment can be used to pay off projects that have been included in the TIF Plan. This method of financing is a very viable alternative and should be seriously considered. This method of financing will not be used for calculating the revised user charge rates.

8.4.5 Service Charges

Wisconsin Statute 66.0821(3) empowers a City to establish service charges in such amount as to meet all the financial requirements for the construction, reconstruction, improvement, extension, operation, maintenance, repair, and depreciation of a wastewater system. Further, such service charges may be adjusted to cover the payment of all principal and interest of any indebtedness incurred thereof, including the replacement of funds advanced by or paid for the general fund of the municipality. These charges may include a reasonable excess. To date, the City of Fennimore has produced revenue to operate its wastewater treatment facilities chiefly by the service charge method. The actual basis of the charges is at the discretion of the City Council.

8.5 Financing Methods

There are six possible methods of financing the proposed improvements. These include general obligation bonds, revenue bonds, special assessment bonds, direct loans from private institutions, financing through government programs, and immediate payment. Immediate payment is not possible because of the lack of available City general funds. Assessment bonds are eliminated because of the financial impact of the customers. That leaves four major financing methods for the City.

8.5.1 General Obligation Bonds

General obligation bonds are readily saleable and the interest rate is relatively low. These bonds are not dependent on service charges although service charges can be used to provide the needed revenue. The total amount of general obligation bonds which can be issued by a City is limited by Wisconsin Statutes to 5% of the equalized valuation of the City. There are many serious disadvantages to this method of financing for projects such as this. First, it is possible that not all users of the new facilities would contribute to the support of the facilities. This would depend upon the method used to recover the payments for these bonds. Secondly, the use made of the wastewater treatment facilities will not necessarily be directly related to the value of a property utilizing the facilities. Third, the sale of general obligation bonds for a utility purpose can affect the credit rating issued to the City at the time of the sale of future bonds issues covering other general expenditures.

8.5.2 Revenue Bonds

The advantages of revenue bonds are that their sales do not affect the credit rating or bonding power of the City, and they are equitable in that the users of the system pay the capital cost of the facilities. Mortgage revenue bonds are very saleable in Wisconsin if the service charge is such that the net revenues of the utility, after expenses and depreciation, are approximately 1.25 times the debt retirement and operation and maintenance costs. The interest rate for these bonds generally is 1 to 2 percent greater than for general obligation bonds.

8.5.3 Direct Loans

The unfunded portion of the treatment plant improvements is quite a large amount, lessening the chance of direct loans from financial institutions or government agencies. Moreover, if available, the interest rates on direct loans may well be less than for either general obligation or mortgage revenue bonds. There are fewer restrictions on the method of revenue generation, and there is less effect on the bonding powers and credit rating of the community than with general obligation bonds.

8.5.4 Financing Through Government Programs

Past demand for improved wastewater treatment resulted in the institution of state and federal programs for financial assistance to communities undertaking the construction of wastewater treatment facilities improvements. The following sections summarize the government funding programs which may be available.

8.6 Funding Sources

8.6.1 Rural Development (RD)

Rural Development, formerly Farmers Home Administration (FmHA), of the U.S. Department of Agriculture provides financial assistance to small rural communities (those under a population of 10,000). RD has a program in which it provides financial assistance in the form of grants and low-interest loans for construction of wastewater collection and treatment systems.

Grants are available for up to 75% of eligible project costs. Although the grants are made to the City governmental unit, the grant is intended to benefit only residential users and small commercial users. The portion of the project which might benefit larger commercial users and industrial users would be deducted from the eligible project cost. To receive a grant, the user charge rates are set on a median household income, based on the amount of water usage the residential population utilizes.

This governmental agency also provides loan funds to small rural communities to upgrade wastewater collection and treatment systems. The current interest rates range from 2.00% to 3.25% based on income levels. Based on Fennimore's current median household income (MHI), the City would likely qualify for an intermediate interest rate loan with a 40 year payback period. These loans are classified as revenue bond type loans and are secured only by sewer use charges. The City intends to apply for grant and loan funding for this project from RD. For the user charge impacts described in subsequent paragraphs it will be assumed that the project will be funded through this source as one alternative for financial considerations.

8.6.2 Community Development Block Grant (CDBG)

The Community Development Block Grant (CDBG) program is a federal formula-allocated grant program under the U.S. Department of Housing and Urban Development (HUD). The State of Wisconsin, Department of Administration administers the state Community Development Block Grant program for public facilities (CDBG-PF), which provides grant money to expand and improve public infrastructure and facility projects critical to community vitality and sustainability. A municipality can qualify for this grant under several conditions, i.e., low and moderate income, urgent need or economic development. These grants are highly competitive, and may require multiple attempts before obtaining. Based on Fennimore's current MHI, it is not likely that City would not qualify for a CDBG. For the purposes of the user charge calculations, no grant will be utilized.

8.6.3 State of Wisconsin Financial Assistance Programs (CWF)

The Wisconsin Clean Water Fund (CWF) is a revolving loan fund program now available. This loan fund is provided to finance the entire cost of wastewater treatment facility construction projects at 75% of the market rate that the State of Wisconsin pays for its bonds. The effective interest rate is currently at 2.25% level for eligible parts of the treatment facility. The remaining proportion of the facility would be funded at full market rate. Only those communities whose treatment facilities are in basic compliance with effluent standards are eligible. For treatment plants in violation of effluent standards full financing is available, but at the full market rate. Additionally, the portion of projects for receiving and storing septage and capacity for treating septage can be financed at 0% interest through the CWF program.

There is a possibility for some communities that the program will provide "hardship assistance" where sewer use charges under the loan program will be unreasonably high. CWFP can provide hardship financial assistance in the form of a reduced interest rate loan, or award a grant of up to 70% of the municipality's project cost eligible for below-market interest rate. A project is eligible if all of the following apply:

- The project is a wastewater project for compliance maintenance, unsewered, or new/changed limits.
- The municipality's MHI is 80 percent or less of the state's median household income.
- The estimated total annual charges per residential user for wastewater treatment in the municipality would, without hardship assistance, exceed 2 percent of the municipality's median household income.

The City intends to apply for grant and loan funding from the CWF program for Phase 1 construction. It is possible that the City will qualify for a principal forgiveness grant under the hardship financial assistance program, but for the purposes of the user charge calculations, no principal forgiveness will be assumed.

8.6.4 Other:

Focus on Energy - Focus on Energy incentive programs are available to municipal customers of participating Wisconsin utilities to implement energy efficiency projects. Prescriptive incentives are offered for standard energy efficient technologies that have predictable and predetermined savings, including lighting, many HVAC measures, motors and drives, and others. Custom incentives are available for technologies such as energy efficient aeration and heat recovery and are calculated on a case-by-case basis based on the estimated first year energy savings associated with a project/technology. Custom incentives may pay up to 50 percent of a project's cost, for a maximum of $200,000 and are available for projects that have a payback between 1.5 and 10 years. There may be opportunities for the City to apply for Focus on Energy incentives for the proposed Phase 1 construction.

8.7 Summary of Probable Financing

Any of the four practical financing methods may be used, i.e., general obligations bonds, revenue bonds, direct loans from private sources, or government program financing. It is likely that the best interest rates will be achieved through the Wisconsin CWF Loan program. Also, significant grant funding could be available through Rural Development and the CDBG programs. For the purposes of this Facilities Plan, a CWF loan is assumed, but the City will continue to pursue CDBG and Rural Development funding.

8.8 Projected User Charge Rates

The projected user charge rate needs to take several components into consideration. These components include existing debt, future debt of the treatment facility expansion, debt or cost for future public works projects, collection system depreciation, replacement funds, total annual operation costs and alternate approaches in calculating user charges with a cash flow schedule.

The last increase in sewer user rates for City of Fennimore was enacted in June 2014. Current rates are described in Section 8.4 and are approximately $30/month for an average residential user. Increased rates will be required to cover the costs of the Phase 1. Costs for Phase 2 and 3 have not been including in the cost analyses and user charge rates developed in this document. It is assumed that Phase 2 costs to meet new phosphorus limits will not take place until 2021 and may include increased O&M costs, costs for watershed-based approaches or payments to the LCD, or construction of a new filter.

It is also anticipated that the City will continue to perform sewer improvements annually as well as other projects included in the Capital Improvements Plan (in progress). Revenue to cover the costs of sewer improvements will be collected through the user charge system. Besides the improvements, the system depreciation, new debt and total operation costs will be used for calculating user charges. Appendix Q provides a summary of these numbers and a cash flow for a 7-year projection.

The final component of the user charge system is the methodology and implementation schedule of the rate increases. Stepped rate increases are recommended as presented in the cash flow calculations. The final rates will vary depending on the method developed.

User charges for an average residential customer are expected to increase from the current average residential charge of $30 per month to between $41 and $49 per month in 2016, and increase to between $56 and $75 per month over the next six to seven years, depending on the methodology of the user charge system and the amount of grant money included in the funding package. This assumes an average residential water use rate of 3,071 gallons per month. It should be noted that other revenue generating sources can be utilized such as impact fees, grants, energy grants and other funding mechanisms. If these methodologies are implemented, the rates presented would be reduced accordingly. These user rates do not take into account the possible addition of a filter that may be required for phosphorus removal, or other work that may be performed as part of Phase 2 or 3 construction.

8.9 Implementation Steps and Schedule

The following sequence of important steps is expected to be followed in the implementation of this Facilities Plan:

1. Submittal of this plan for review by the Wisconsin Department of Natural Resources.
2. Hold a Public Hearing.
3. Incorporation of comments from reviewing agencies and the public hearing into the Facilities Plan.
4. Investigate alternative funding sources for this project, specifically Rural Development.
5. Complete design, construction plans and specifications.
6. Submit plans and specifications for review by the Wisconsin Department of Natural Resources.
7. Update sewer use/user charge ordinance.
8. Incorporate comments from reviewing agencies into plans and specifications.
9. Submit applications for financial assistance.
10. Obtain approval of the funding agency(ies) to bid the project.
11. Advertisement of bids.
12. Receive bids.
13. Close on the loan documents.
14. Award bids.
15. Start construction.
16. Complete construction.
17. Develop an operation and maintenance manual.

The City of Fennimore intends to apply for funding through Rural Development's water and wastewater program and the Wisconsin CWF to finance Phase 1 construction. The following implementation schedule is based on the timelines for these loan programs. Due to the current state of the RBCs and potential for failure, the City intends to follow the accelerated schedule to have the upgraded WWTF running as soon as possible; however, the actual schedule will depend on the availability of financing and possible interim financing costs.

Proposed Implementation Schedule

	Accelerated Schedule	**Normal Schedule**
Submit Draft of Facilities Plan	October 15, 2015	October 15, 2015
Proceed with Preliminary Design	October 1, 2015	October 1, 2015
Submit CWF ITA	October 31, 2015	October 31, 2015
Public Hearing on Plan	November, 2015	November, 2015
Submit Rural Development Application	November 15, 2015	November 15, 2015
Proceed with Final Design	December 15, 2015	December 15, 2015
Approval of Facilities Plan	December 15, 2015	December 15, 2015
Obtain Preliminary commitment for Rural Development	January 15, 2016	January 15, 2016
Submit Plans and Specifications	May 1, 2016	September 30, 2016
Submit CWF Loan Application	May 1, 2016	September 30, 2016
Submit User Charge Rates/Ordinances	May 1, 2016	September 30, 2016
Advertise for Bids	May 1, 2016	October 1, 2016
Approval of Plans and Specifications	June 30, 2016	December 1, 2016
Open Bids	June 15, 2016	December 15, 2016
Clean Water Fund Closing	January 1, 2017	February 15, 2017
Award Bids	July 15, 2016	February 1, 2017
Start Construction	August 1, 2016	March 1, 2017
Complete Phase 1 Construction	December 15, 2017	August 1, 2018

APPENDIX A

Current WPDES Permit

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

CITY OF FENNIMORE

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
US HIGHWAY 61 SOUTH & MCGHAN ROAD, FENNIMORE, WISCONSIN
to
Gregory Branch (Upper Grant River Watershed, GP06 – Grant-Platte River Basin) in Grant County

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By Lloyd L. Eagan
Lloyd L. Eagan
District South Water Leader

August 26, 2013
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - October 01, 2013 **EXPIRATION DATE - September 30, 2018**

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1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
701	Representative influent samples shall be collected after the comminutor.

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 701 - INFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	Representative effluent samples shall be collected from the clear-well, prior to discharge to Gregory Branch.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 001 - EFFLUENT

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD_5, Total	Daily Max	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Monthly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Daily Max	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH_3-N) Total	Daily Max	11 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	8.0 mg/L	3/Week	24-Hr Flow Prop Comp	Apr 1 through Apr 30
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	3.4 mg/L	3/Week	24-Hr Flow Prop Comp	May 1 through Sept 30
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	3.3 mg/L	3/Week	24-Hr Flow Prop Comp	Apr 1 through Apr 30
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	1.5 mg/L	3/Week	24-Hr Flow Prop Comp	May 1 through Sept 30
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	5.4 mg/L	3/Week	24-Hr Flow Prop Comp	Oct 1 through March 31
Dissolved Oxygen	Daily Min	4.0 mg/L	3/Week	Grab	
pH Field	Daily Max	9.0 su	3/Week	Grab	
pH Field	Daily Min	6.0 su	3/Week	Grab	

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	Note that this is an interim limit. See 2.2.1.2 and 2.2.1.3 below for the final water quality based phosphorus limits and available alternatives for meeting the final limits.
Chloride	Weekly Avg	510 mg/L	4/Month	24-Hr Flow Prop Comp	Sampling shall be done on four consecutive days one week per month. This is an interim limit. See 2.2.1.5 below for Source Reduction Measures and 4.2 in the "Schedules" section of this permit for the applicable chloride target value.
Chloride		lbs/day	4/Month	Calculated	Calculate the daily mass discharge of chloride in lbs/day on the same days chloride sampling occurs. Daily mass (lbs/d) = daily concentration (mg/L) x daily flow (MGD) x 8.34.
Temperature Maximum		deg F	3/Week	Continuous	Oct 1 through Nov 30 - Monitor Only - See 2.2.1.1 below for effluent temperature monitoring requirements.
Acute WET		TU_a	See Listed Qtr(s)	24-Hr Flow Prop Comp	See 2.2.1.4 below for monitoring dates and WET requirements.
Chronic WET		rTU_c	See Listed Qtr(s)	24-Hr Flow Prop Comp	See 2.2.1.4 below for monitoring dates and WET requirements.

2.2.1.1 Effluent Temperature Monitoring

For manually measuring effluent temperature, grab samples should be collected at 6 evenly spaced intervals during the 24-hour period. Alternative sampling intervals may be approved if the permittee can show that the maximum effluent temperature is captured during the sampling interval. For monitoring temperature continuously, collect measurements in accordance with s. NR 218.04(13). This means that discrete measurements shall be recorded at intervals of not more than 15 minutes during the 24-hour period. In either case, report the maximum temperature measured during the day on the DMR. For seasonal discharges collect measurements either manually or continuously during the period of operation and report the daily maximum effluent temperature on the DMR.

2.2.1.2 Phosphorus Water Quality Based Effluent Limitations

The final water quality based effluent limitations for phosphorus are 0.075 mg/L (0.39 lbs/day) as a six-month seasonal average and 0.225 mg/L as a monthly average unless:

(A) As part of the application for the next reissuance, or prior to filing the application, the permittee submits either: 1.) a watershed adaptive management plan and a completed Watershed Adaptive Management Request Form 3200-139; or 2.) an application for water quality trading; or 3.) an application for a variance; or 4.) new information or additional data that supports a recalculation of the numeric limitation; and

(B) The Department modifies, revokes and reissues, or reissues the permit to incorporate a revised limitation before the expiration of the compliance schedule*.

If Adaptive Management or Water Quality Trading is approved as part of the permit application for the next reissuance or as part of an application for a modification or revocation and reissuance, the plan and specification submittal, construction, and final effective dates for compliance with the total phosphorus WQBEL may change in the reissued or modified permit. In addition, the numeric value of the water quality based effluent limit may change based on new information (e.g. a TMDL) or additional data. If a variance is approved for the next reissuance, interim limits and conditions will be imposed in the reissued permit in accordance with s. 283.15, Stats., and applicable regulations. A permittee may apply for a variance to the phosphorus WQBEL at the next reissuance even if the permittee did not apply for a phosphorus variance as part of this permit reissuance.

*Note: The Department will prioritize reissuances and revocations, modifications, and reissuances of permits to allow permittees the opportunity to implement adaptive management or nutrient trading in a timely and effective manner.

Note: If a water quality based effluent limit has taken effect in a permit, any increase in the limit is subject to s. NR 102.05(1) and ch. NR 207 Wis. Adm. Code.

Note: When a six-month seasonal average effluent limit is specified for Total Phosphorus the applicable averaging periods are May through October and November through April.

2.2.1.3 Alternative Approaches to Phosphorus WQBEL Compliance

Rather than upgrading its wastewater treatment facility to comply with WQBELs for total phosphorus, the permittee may use Water Quality Trading or the Watershed Adaptive Management Option, to achieve compliance under ch. NR 217, Wis. Adm. Code, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. A permittee may also implement an upgrade to its wastewater treatment facility in combination with Water Quality Trading or the Watershed Adaptive Management Option to achieve compliance, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. If the Final Compliance Alternatives Plan concludes that a variance will be pursued, the Plan shall provide information regarding the basis for the variance.

Submittal of Permit Application for Next Reissuance and Adaptive Management or Pollutant Trading Plan or Variance Application: The permittee shall submit the permit application for the next reissuance at least 6 months prior to expiration of this permit. If the permittee intends to pursue adaptive management to achieve compliance with the phosphorus water quality based effluent limitation, the permittee shall submit with the application for the next reissuance: a completed Watershed Adaptive Management Request Form 3200-139, the completed Adaptive Management Plan and final plans for any system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the permittee intends to pursue pollutant trading to achieve compliance, the permittee shall submit an application for water quality trading with the application for the next reissuance. If system upgrades will be used in combination with pollutant trading to achieve compliance with the final water quality-based limit, the reissued permit will specify a schedule for the necessary upgrades. If the permittee intends to seek a variance, the permittee shall submit an application for a variance with the application for the next reissuance.

2.2.1.4 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Gregory Branch Stream

Instream Waste Concentration (IWC): 80%

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 75, 50, 25, 12.5% and any additional selected by the permittee.

WET Testing Frequency: Tests are required during the following quarters.

- **Acute:** *July 1– September 30, 2014; and October 1–December 31, 2015 (two tests total)*
- **Chronic:** *July 1–September 30, 2014; and October 1–December 31, 2015; and January 1–March 31, 2016 (three tests total)*

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The original Discharge Monitoring Report (DMR) form and one copy shall be sent to the contact and location provided on the DMR by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: If $LC_{50} \geq 100$, then $TU_a = 1.0$. If LC_{50} is < 100, then $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Relative Toxic Unit - Chronic (rTU_c) is greater than 1.0 for either species. The rTU_c shall be calculated as follows: If $IC_{25} \geq IWC$, then $rTU_c = 1.0$. If $IC_{25} < IWC$, then $rTU_c = IWC \div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90 day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

2.2.1.5 Chloride Variance – Implement Source Reduction Measures

This permit contains a variance to the water quality-based effluent limit (WQBEL) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the table above, (b) implement the chloride source reduction measures specified below, and (c) perform the actions listed in the compliance schedule. (See the Schedules of Compliance section herein.):

Tier I Requirements

- Continue education and outreach efforts regarding chloride reduction to the largest water users in Fennimore.
- Educate homeowners on the impact of chloride from residential softeners, discuss options available for increasing softener salt efficiency, and request voluntary reductions.
- Recommend residential softener tune–ups on a voluntary basis.
- Request voluntary support from local water softening businesses in the efforts described above.
- Educate licensed installers and self–installers of softeners on providing optional hard water for outside faucets for residences.

Tier II Requirements

- Require significant industrial and commercial contributors to evaluate their water treatment systems with regard to softened water requirements, with the results of that evaluation being the basis for potential restrictions of chloride inputs.
- All manholes with pickhole ports shall be corked/plugged to reduced salt meltdown from entering the collection system.
- Continue program of scheduled maintenance or replacement of faulty manhole chimneys.

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
002	Anaerobically digested, Liquid, Class B. Representative sludge samples shall be collected from the sludge storage tank.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 002 - SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Jan 1, 2014 - Dec 31, 2014
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Jan 1, 2014 - Dec 31, 2014
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH_4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

3.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed for the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

3.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

3.2.1.3 Multiple Sludge Sample Points (Outfalls)

If there are multiple sludge sample points (outfalls), but the sludges are not subject to different sludge treatment processes, then a separate List 2 analysis shall be conducted for each sludge type which is land applied, just prior to land application, and the application rate shall be calculated for each sludge type. In this case, List 1, 3, and 4 and PCBs need only be analyzed on a single sludge type, at the specified frequency. If there are multiple sludge sample points (outfalls), due to multiple treatment processes, List 1, 2, 3 and 4 and PCBs shall be analyzed for each sludge type at the specified frequency.

3.2.1.4 Sludge Which Exceeds the High Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

3.2.1.5 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2014**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

3.2.1.6 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3 **PATHOGEN CONTROL FOR CLASS B SLUDGE** The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control. The following requirements shall be met prior to land application of sludge.		
Parameter	**Unit**	**Limit**
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent Process	
* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.		

List 4 **VECTOR ATTRACTION REDUCTION** The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option. One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.		
Option	**Limit**	**Where/When it Shall be Met**
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

3.2.1.7 Daily Land Application Log

Daily Land Application Log		
Discharge Monitoring Requirements and Limitations The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements**.**		
Parameters	**Units**	**Sample Frequency**
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

4 Schedules

4.1 Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

The permittee shall comply with the WQBELs for Phosphorus as specified. No later than 30 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance. If a submittal is required, a timely submittal fulfills the notification requirement.

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare and submit to the Department for approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by June 30, 2016. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than June 30, 2016 and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report. If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by June 30, 2016 and is not required to comply with the milestones identified below for years 3 through 9 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance').	09/30/2014
Study of Feasible Alternatives: If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than June 30, 2022.	09/30/2014
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	09/30/2015
Preliminary Compliance Alternatives Plan: The permittee shall submit a preliminary compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee’s wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design	09/30/2016

report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	
Final Compliance Alternatives Plan: The permittee shall submit a final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code. If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2017
Progress Report on Plans & Specifications: Submit progress report regarding the progress of preparing final plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2018
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance is subject to s. 283.53(2) Stats.) Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2019
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2019
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2020
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2021
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface	08/31/2022

Water section of this permit.	
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2022

4.2 Chloride Target Value

As a condition of the variance to the water quality based effluent limitation(s) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code, the permittee shall perform the following actions. The target value for 2018 is 400 mg/L.

Required Action	Due Date
Annual Chloride Progress Report: Submit an annual progress report, that shall indicate which chloride source reduction measures have been implemented. The report shall also include a calculated annual mass discharge of chloride based on chloride sampling and flow data. After the first progress report is submitted, the permittee may submit a written request to the department to waive further annual progress reports. If after evaluating the progress of the source reduction measures, the department decides to accommodate the request, the department shall notify the permittee in writing that the subsequent annual reports are waived. The Final Chloride Report cannot be waived and shall be submitted by the Date Due. Note that the interim limitation of 510 mg/L remains enforceable until new enforceable limits are established in the next permit reissuance. The first annual chloride progress report is to be submitted by the Date Due.	09/30/2014
Annual Chloride Progress Report #2: Submit a chloride progress report.	09/30/2015
Annual Chloride Progress Report #3: Submit a chloride progress report.	09/30/2016
Annual Chloride Progress Report #4: Submit a chloride progress report.	09/30/2017
Final Chloride Report: Submit a final report documenting the success in meeting the chloride target value of 400 mg/L, as well as the anticipated future reduction in chloride sources and chloride effluent concentrations. This report shall also include proposed target values and source reduction measures for negotiations with the department if the permittee intends to seek a renewed chloride variance per s. NR 106.83, Wis. Adm. Code, for the reissued permit. Note that the target value is the benchmark for evaluating the effectiveness of the chloride source reduction measures, but is not an enforceable limitation under the terms of this permit.	03/31/2018

5 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit, except for s. NR 205.07(1)(v) and (2)(d) regarding bypasses and overflows which are specified below under the subsections titled 'Bypassing' and 'Bypass Due to Essential Construction or Maintenance (Controlled Diversions)'. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a principal executive officer, a ranking elected official or other duly authorized representative. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.
- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.
- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation
- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

A separate CMAR certification document, that is not part of the electronic report form, shall be mailed to the Department at the time of electronic submittal of the CMAR. The CMAR certification shall be signed and submitted by an authorized representative of the permittee. The certification shall be submitted by mail. The certification shall verify the electronic report is complete, accurate and contains information from the owner's treatment works.

5.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

5.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.2 System Operating Requirements

5.2.1 Noncompliance Notification

- The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:
  - any noncompliance which may endanger health or the environment;
  - any violation of an effluent limitation resulting from an unanticipated bypass;
  - any violation of an effluent limitation resulting from an upset; and
  - any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

- A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at **1-800-943-0003**

5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-536, Wis. Adm. Code.

5.2.4 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility
- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste

5.2.5 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

5.2.6 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

5.2.7 Bypassing

Except as provided in the subsection below titled 'Bypass Due to Essential Construction or Maintenance (Controlled Diversions)', any bypass of wastewater at the treatment works or overflow from the collection system is prohibited, and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats., unless all of the following occur:

- The bypass or overflow was unavoidable to prevent loss of life, personal injury, or severe property damage.
- There were no feasible alternatives to the bypass or overflow, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass or overflow which occurred during normal periods of equipment downtime or preventive maintenance.
- The permittee notifies the department of the unscheduled bypass or overflow. The permittee shall notify the department within 24 hours of initiation of the bypass or overflow occurrence by telephone, voicemail, fax or e-mail. Except for an approved blending event, within 5 days of conclusion of the bypass or overflow occurrence, the permittee shall submit to the department in writing, all of the following information:
  - Reason the bypass or overflow occurred, or explanation of other contributing circumstances that resulted in the overflow event. If the overflow or bypass is associated with wet weather, provide data on the amount and duration of the rainfall or snow melt for each separate event.
  - Date the bypass or overflow occurred.
  - Location where the bypass or overflow occurred.
  - Duration of the bypass or overflow and estimated wastewater volume discharged.
  - Steps taken or the proposed corrective action planned to prevent similar future occurrences.
  - Any other information the permittee believes is relevant.

5.2.8 Bypass Due to Essential Construction or Maintenance (Controlled Diversion)

A bypass which occurs due to essential construction or maintenance to assure efficient operation of the treatment works is allowed but only if the bypass complies with all effluent limitations in this permit. For these bypasses, any wastewater that is diverted around a treatment unit or treatment process shall be recombined with wastewater that is not diverted prior to discharge.

Any bypass due to essential maintenance or construction to assure efficient operation of the treatment works shall be documented in writing and the record shall be made available to the Department upon request.

5.2.9 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. The wastewater treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2), Wis. Adm. Code. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.3 Surface Water Requirements

5.3.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.3.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

5.3.3 Effluent Temperature Requirements

Weekly Average Temperature – The permittee shall use the following formula for calculating effluent results to determine compliance with the weekly average temperature limit (as applicable): Weekly Average Temperature = the sum of all daily maximum results for that week divided by the number of daily maximum results during that time period.

Cold Shock Standard – Water temperatures of the discharge shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock. 'Cold Shock' means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavior or physiological performance and may lead to death.

Rate of Temperature Change Standard – Temperature of a water of the state or discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

5.3.4 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.3.5 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

5.3.6 Chloride Notification

The permittee shall notify the Department in writing of any proposed changes which may affect the characteristics of the wastewater, which results in an increase in the concentration of chloride, under the authority of sections 283.31(4)(b) and 283.59(1), Stats. This notification shall include a description of the proposed source of chlorides and the anticipated increase in concentration. Following receipt of the notification, the Department may propose a modification to the permit.

5.3.7 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.3.8 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Watershed Management, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

5.4 Land Application Requirements

5.4.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

5.4.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

5.4.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

5.4.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the ‘eReport Certify’ page by a principal executive officer, ranking elected official or duly authorized representative. The ‘eReport Certify’ page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility’s DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

5.4.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =
[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

5.4.6 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for "PCB, Total Dry Wt" is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note**: It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

5.4.7 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a principal executive officer, ranking elected official or duly authorized representative. The ‘eReport Certify’ page certifies that the electronic report form is true, accurate and complete.

5.4.8 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the ‘eReport Certify’ page by a principal executive officer, ranking elected official or duly authorized representative. The ‘eReport Certify’ page certifies that the electronic report form is true, accurate and complete.

5.4.9 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

5.4.10 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

5.4.11 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

5.4.12 Class B Sludge: Anaerobic Digestion

Treat the sludge in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35° C to 55° C and 60 days at 20° C. Straight-line interpolation to calculate mean cell residence time is allowable when the temperature falls between 35° C and 20° C.

5.4.13 Vector Control: Volatile Solids Reduction

The mass of volatile solids in the sludge shall be reduced by a minimum of 38% between the time the sludge enters the digestion process and the time it either exits the digester or a storage facility. For calculation of volatile solids reduction, the permittee shall use the Van Kleeck equation or one of the other methods described in "Determination of Volatile Solids Reduction in Digestion" by J.B. Farrell, which is Appendix C of EPA's *Control of Pathogens in Municipal Wastewater Sludge* (EPA/625/R-92/013). The Van Kleeck equation is:

$$VSR\% = \frac{VS_{IN} - VS_{OUT}}{VS_{IN} - (VS_{OUT} \times VS_{IN})} \times 100$$

Where: VS_{IN} = Volatile Solids in Feed Sludge (g VS/g TS)

VS_{OUT} = Volatile Solids in Final Sludge (g VS/g TS)

VSR% = Volatile Solids Reduction, (Percent)

6 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	**Date**	**Page**
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Operational Evaluation Report	September 30, 2014	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Study of Feasible Alternatives	September 30, 2014	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Compliance Alternatives, Source Reduction, Improvements and Modifications Status	September 30, 2015	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Preliminary Compliance Alternatives Plan	September 30, 2016	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Compliance Alternatives Plan	September 30, 2017	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Progress Report on Plans & Specifications	September 30, 2018	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Plans and Specifications	September 30, 2019	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Treatment Plant Upgrade to Meet WQBELs	December 31, 2019	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Construction Upgrade Progress Report	December 31, 2020	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Construction Upgrade Progress Report	December 31, 2021	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Complete Construction	August 31, 2022	14
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Achieve Compliance	September 30, 2022	14
Chloride Target Value -Annual Chloride Progress Report	September 30, 2014	14
Chloride Target Value -Annual Chloride Progress Report #2	September 30, 2015	14
Chloride Target Value -Annual Chloride Progress Report #3	September 30, 2016	14
Chloride Target Value -Annual Chloride Progress Report #4	September 30, 2017	14
Chloride Target Value -Final Chloride Report	March 31, 2018	14
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	16
General Sludge Management Form 3400-48	prior to any significant sludge management changes	21
Characteristic Form 3400-49 and Lab Report	by January 31 following each year	21

	of analysis	
Land Application Report Form 3400-55	by January 31, each year whether or not non-exceptional quality sludge is land applied	22
Report Form 3400-52	by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied	23
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	15

Report forms shall be submitted electronically in accordance with the reporting requirements herein. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Water Quality, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to:
South Central Reg - Dodgeville, 1500 N. Johns Street, Dodgeville, WI 53533-2116

APPENDIX B

Soils Information

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Grant County, Wisconsin

Fennimore WWTF

April 2, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:2,490 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 35, 70, 140, 210

Feet: 0, 100, 200, 400, 600

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grant County, Wisconsin
Survey Area Data: Version 9, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 2, 2011—Aug 21, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Grant County, Wisconsin (WI043)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
194D2	Newglarus silt loam, moderately deep, 12 to 20 percent slopes, moderately eroded	0.1	0.5%
Ar	Arenzville silt loam	2.8	19.9%
DcC2	Dodgeville silt loam, deep, 6 to 10 percent slopes, moderately eroded	0.3	2.2%
DtB2	Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded	0.0	0.2%
DtC2	Dubuque silt loam, deep, 6 to 10 percent slopes, moderately eroded	0.1	0.9%
DtD2	Dubuque silt loam, deep, 10 to 15 percent slopes, moderately eroded	2.4	16.8%
DtE2	Dubuque silt loam, deep, 15 to 20 percent slopes, moderately eroded	0.3	1.9%
DvD2	Dubuque soils, deep, 10 to 15 percent slopes, moderately eroded	4.2	29.6%
JuA	Judson silt loam, 0 to 3 percent slopes	0.5	3.5%
SoE2	Sogn silt loam, 15 to 20 percent slopes, moderately eroded	3.5	24.6%
Totals for Area of Interest		**14.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Grant County, Wisconsin

194D2—Newglarus silt loam, moderately deep, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2t7xq
Elevation: 560 to 1,740 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 140 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Newglarus, moderately deep, and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newglarus, Moderately Deep

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess derived from sedimentary rock over clayey pedisediment derived from sedimentary rock

Typical profile

Ap - 0 to 7 inches: silt loam
Bt1 - 7 to 20 inches: silty clay loam
2Bt2 - 20 to 34 inches: clay
3R - 34 to 44 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 10 to 25 inches to strongly contrasting textural stratification; 20 to 39 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.07 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Minor Components

Fayette

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Dubuque

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Palsgrove

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Ar—Arenzville silt loam

Map Unit Setting

National map unit symbol: g7br
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Arenzville and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arenzville

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Silty alluvium

Typical profile

H1 - 0 to 15 inches: silt loam
H2 - 15 to 40 inches: silt loam
H3 - 40 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Very high (about 12.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Other vegetative classification: High AWC, adequately drained (G105XY008WI)

Minor Components

Alluvial land

Percent of map unit:
Landform: Depressions, drainageways

Marsh

Percent of map unit:
Landform: Depressions

DcC2—Dodgeville silt loam, deep, 6 to 10 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: g7cl
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Dodgeville, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dodgeville, Deep

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from dolomite

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 28 inches: silty clay loam
H3 - 28 to 44 inches: clay
3R - 44 to 80 inches: weathered bedrock

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: 24 to 44 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Other vegetative classification: High AWC, adequately drained (G105XY008WI)

DtB2—Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: g7df
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dubuque, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dubuque, Deep

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from dolomite

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 30 inches: silt loam
H3 - 30 to 60 inches: silty clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: Mod AWC, adequately drained (G105XY005WI)

DtC2—Dubuque silt loam, deep, 6 to 10 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: g7dh
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Dubuque, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dubuque, Deep

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from dolomite

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 30 inches: silt loam
H3 - 30 to 60 inches: silty clay

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Other vegetative classification: Mod AWC, adequately drained (G105XY005WI)

DtD2—Dubuque silt loam, deep, 10 to 15 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: g7dk
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Dubuque, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dubuque, Deep

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from dolomite

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 30 inches: silt loam
H3 - 30 to 60 inches: silty clay

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: Mod AWC, adequately drained (G105XY005WI)

DtE2—Dubuque silt loam, deep, 15 to 20 percent slopes, moderately eroded

Map Unit Setting
National map unit symbol: g7dm
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition
Dubuque, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dubuque, Deep

Setting
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from dolomite

Typical profile
H1 - 0 to 5 inches: silt loam
H2 - 5 to 30 inches: silt loam
H3 - 30 to 60 inches: silty clay

Properties and qualities
Slope: 15 to 20 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: Mod AWC, adequately drained with limitations (G105XY006WI)

DvD2—Dubuque soils, deep, 10 to 15 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 1ktcj
Elevation: 1,020 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Dubuque, soils, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dubuque, Soils, Deep

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from dolomite

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 21 inches: silty clay loam
H3 - 21 to 60 inches: gravelly silty clay

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C
Other vegetative classification: Mod AWC, adequately drained (G105XY005WI)

JuA—Judson silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: g7hj
Elevation: 400 to 1,360 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Judson and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Judson

Setting

Landform: Valleys, valleys
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Dark slope alluvium

Typical profile

H1 - 0 to 18 inches: silt loam
H2 - 18 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Other vegetative classification: High AWC, adequately drained (G105XY008WI)

Minor Components

Alluvial land

Percent of map unit:

Landform: Depressions, drainageways

SoE2—Sogn silt loam, 15 to 20 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: g7k9
Elevation: 550 to 1,360 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Sogn and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sogn

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Very thin loess over residuum weathered from dolomite

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 13 inches: silt loam
H3 - 13 to 19 inches: loam
2R - 19 to 80 inches: unweathered bedrock, weathered bedrock
2R - 19 to 80 inches:

Properties and qualities

Slope: 15 to 20 percent
Depth to restrictive feature: 19 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Other vegetative classification: Low AWC, adequately drained with limitations (G105XY003WI)

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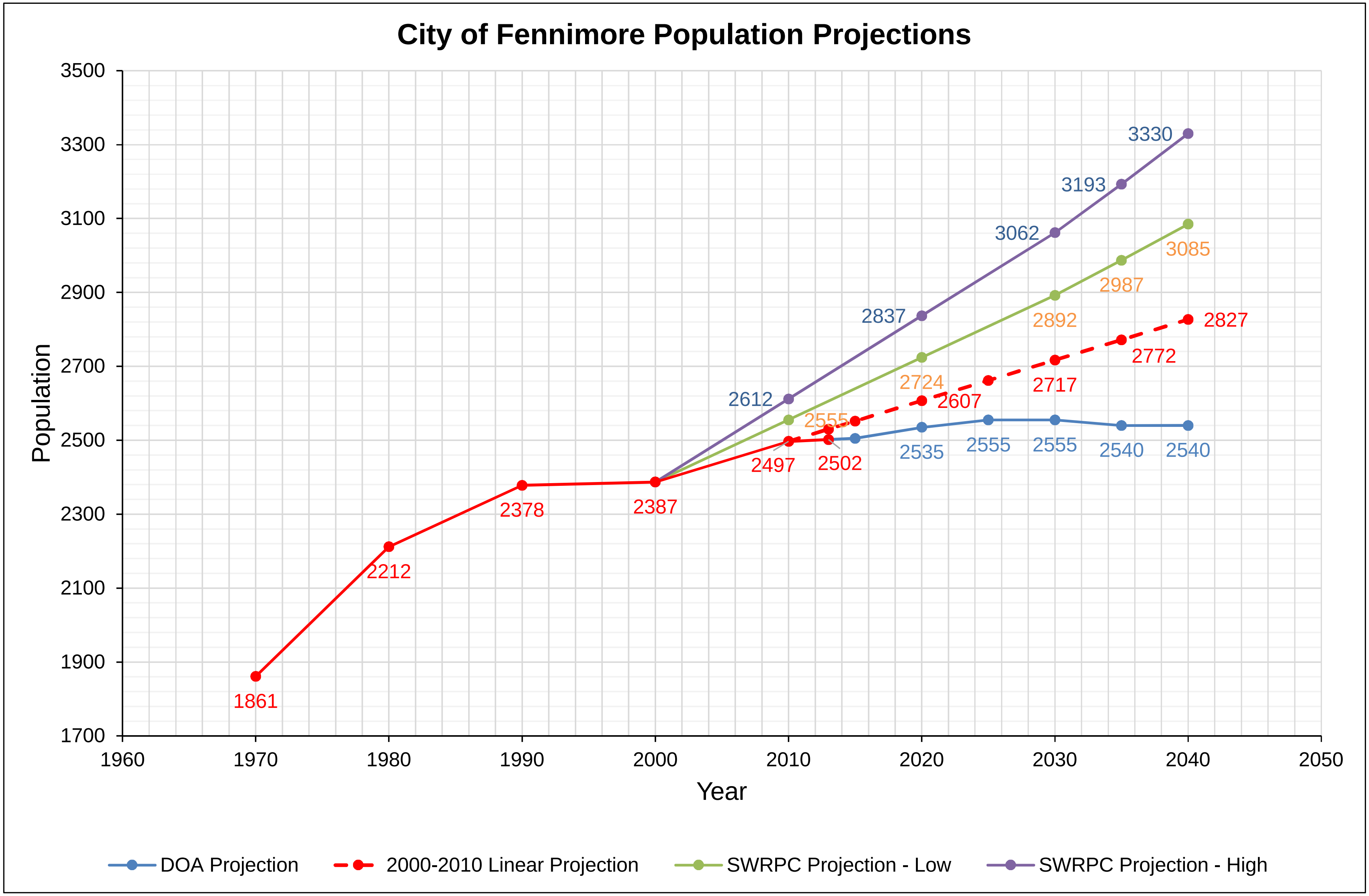
APPENDIX C

Population and Land Use

- Population Projections
- 2003 Comprehensive Plan Excerpts
- 2003 Land Use Map
- Industrial Park Information



City of Fennimore - Populations Projections

J:\JOB#S\Fennimore\FE 04 08\10 Design Information\10.2 Process-Civil\FE Loading Projections
9/25/2015

Wisconsin DOA Municipal Projections, 2010-2040
vintage 2013

Municipality	DOA Code	1970 Census	1980 Census	1990 Census	2000 Census	2010 Census	2013 Estimate	2015 Projection	2020 Projection	2025 Projection	2030 Projection	2035 Projection	2040 Projection	% Change per Year
City of Fennimore	22226	1861	2212	2378	2387	2497	2502	2505	2535	2555	2555	2540	2540	0.07%
Town of Fennimore	22016	676	726	556	599	612	608	605	610	610	605	600	595	-0.12%

Linear Extentsion - Population 2000 - 2010

Municipality	2000	2010	2013	2015	2020	2025	2030	2035	2040
City of Fennimore	2387	2497	2530	2552	2607	2662	2717	2772	2827

Fennimore SWRPC Comprehensive Plan Projections - Low Projection
vintage 2002

Municipality	DOA Code	1970 Census	1980 Census	1990 Census	2000 Census	2010 Census	2020 Projection	2030 Projection	2035 Projection*	2040 Projection*	% Change per Year
City of Fennimore	22226	1861	2212	2378	2387	2555	2724	2892	2987	3085	0.66%
Town of Fennimore	22016	676	726	556	599	585	571	558	551	544	-0.23%

Fennimore SWRPC Comprehensive Plan Projections - High Projection
vintage 2002

Municipality	DOA Code	1970 Census	1980 Census	1990 Census	2000 Census	2010 Census	2020 Projection	2030 Projection	2035 Projection*	2040 Projection*	% Change per Year
City of Fennimore	22226	1861	2212	2378	2387	2612	2837	3062	3193	3330	0.86%
Town of Fennimore	22016	676	726	556	599	645	692	738	764	791	0.72%

*Population was projected through 2030 in the Comprehensive Plan and has been extrapolated from these projections for 2035 and 2040.

City and Town of Fennimore

Comprehensive Plan






Adopted October 2003

With Technical Assistance From:
Southwestern Wisconsin Regional Planning Commission

DEMOGRAPHIC PROJECTIONS
POPULATION PROJECTIONS

The purpose of preparing projections of future population is to provide planners, developers, and others with expected increases or decreases in population in given base years. Reliable projections of population are needed for all kinds of planning or policy decisions whether involving the need for extending utilities, building a new highway, or starting a business. All of these require some notion of probable demand for such facilities. Figure A.11 below is indicative of the historical population trends with both a high and low projection for the City of Fennimore to the year 2030.

FIGURE A.11
CITY OF FENNIMORE
POPULATION PROJECTIONS
(Source: SWWRPC 2002)

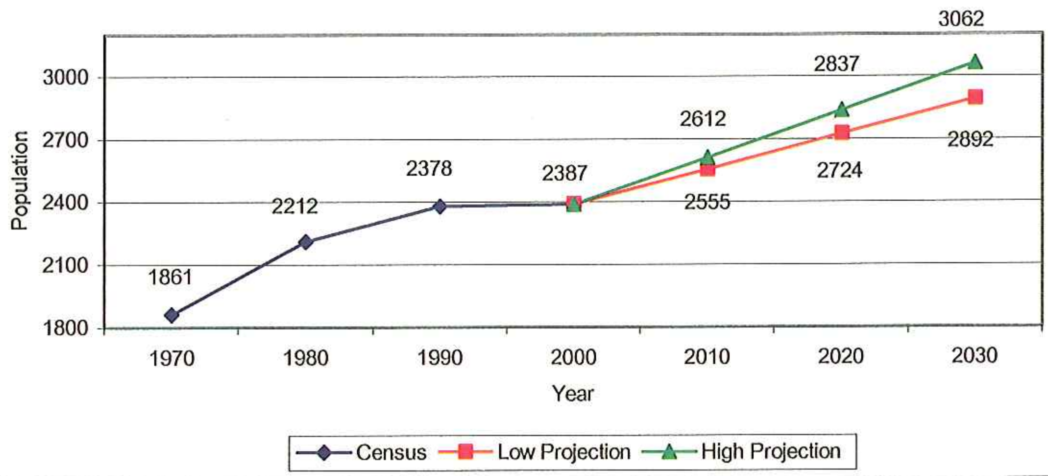
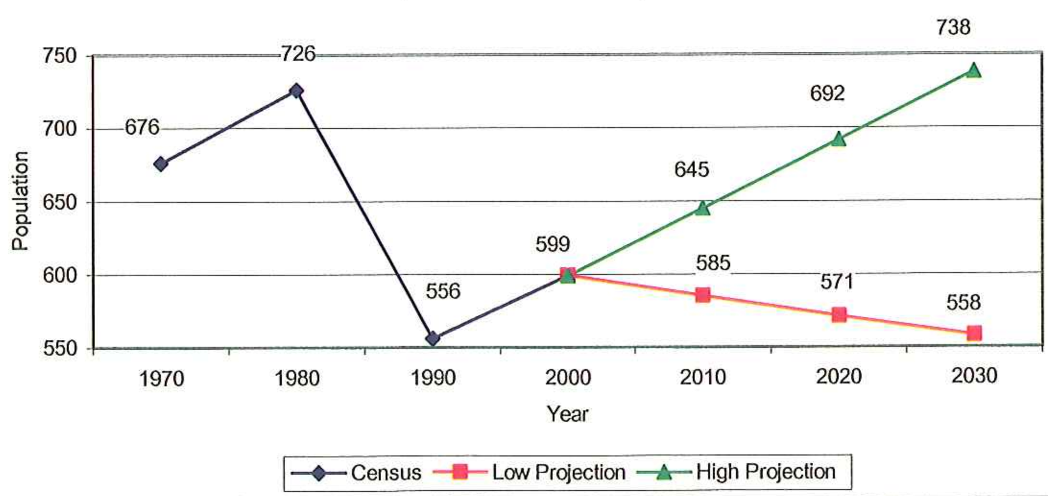


Figure A.12 is reflective of the population trends and projections for the Town of Fennimore for the years 1970 through 2030.

FIGURE A.12
TOWN OF FENNIMORE
POPULATION PROJECTIONS
(Source: SWWRPC 2002)



HOUSEHOLD PROJECTIONS

The household projections are based on the population projections previously presented and the average household size from the 2000 US Census. The table below serves as the household projections for the City and Town of Fennimore.

TABLE A.5
CITY AND TOWN OF FENNIMORE
HOUSEHOLD PROJECTIONS

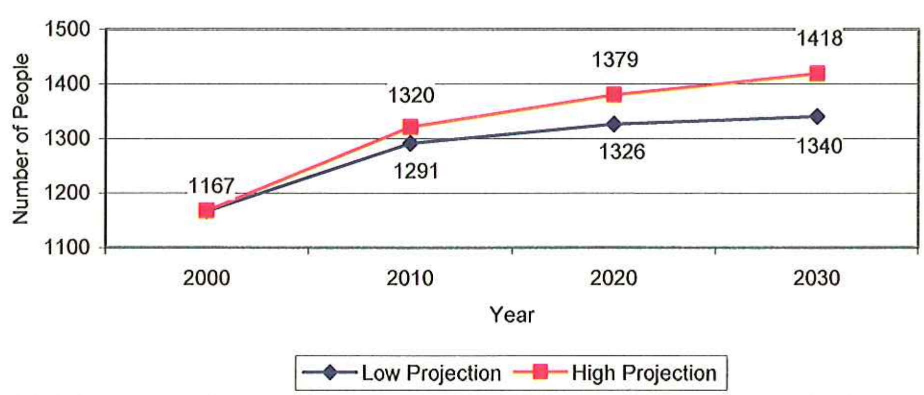
HOUSEHOLD PROJECTIONS	2000*	2010	2020	2030
City of Fennimore – Low Projection	1021*	1091	1164	1235
City of Fennimore – High Projection	1021*	1116	1212	1309
Town of Fennimore – Low Projection	199*	194	190	185
Town of Fennimore – High Projection	199*	214	229	245

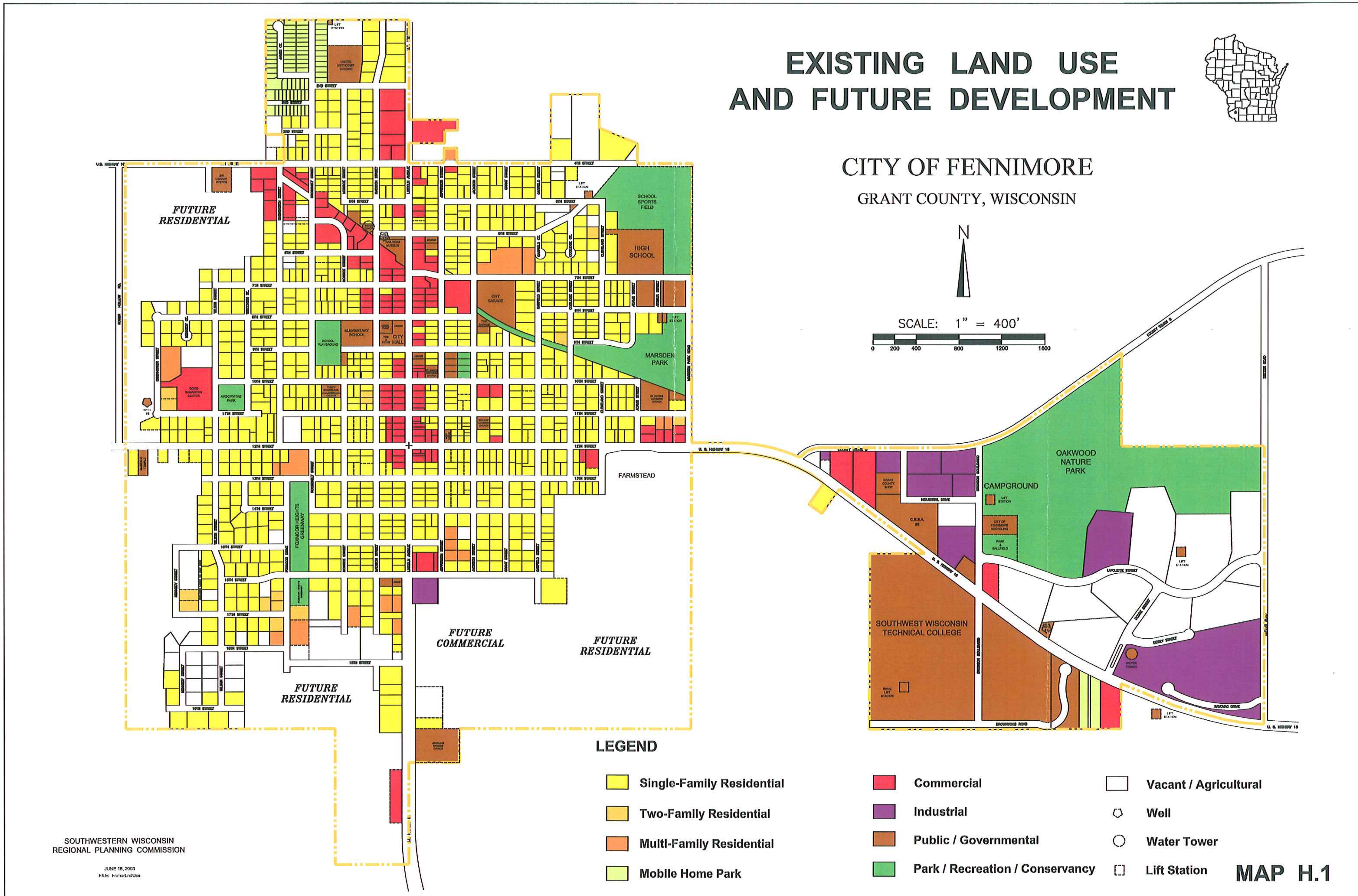
*(Source: 2000 US Census)

LABOR FORCE PROJECTIONS

The following figures are the labor force projections for the City and Town of Fennimore. The projected jobs are not necessarily to be created in these jurisdictions, but indicate the projected labor force residing in the City and Town of Fennimore. Figure A.13 indicates the City of Fennimore Labor Force Projections.

FIGURE A.13
CITY OF FENNIMORE LABOR FORCE PROJECTIONS
(Source: SWWRPC 2002)

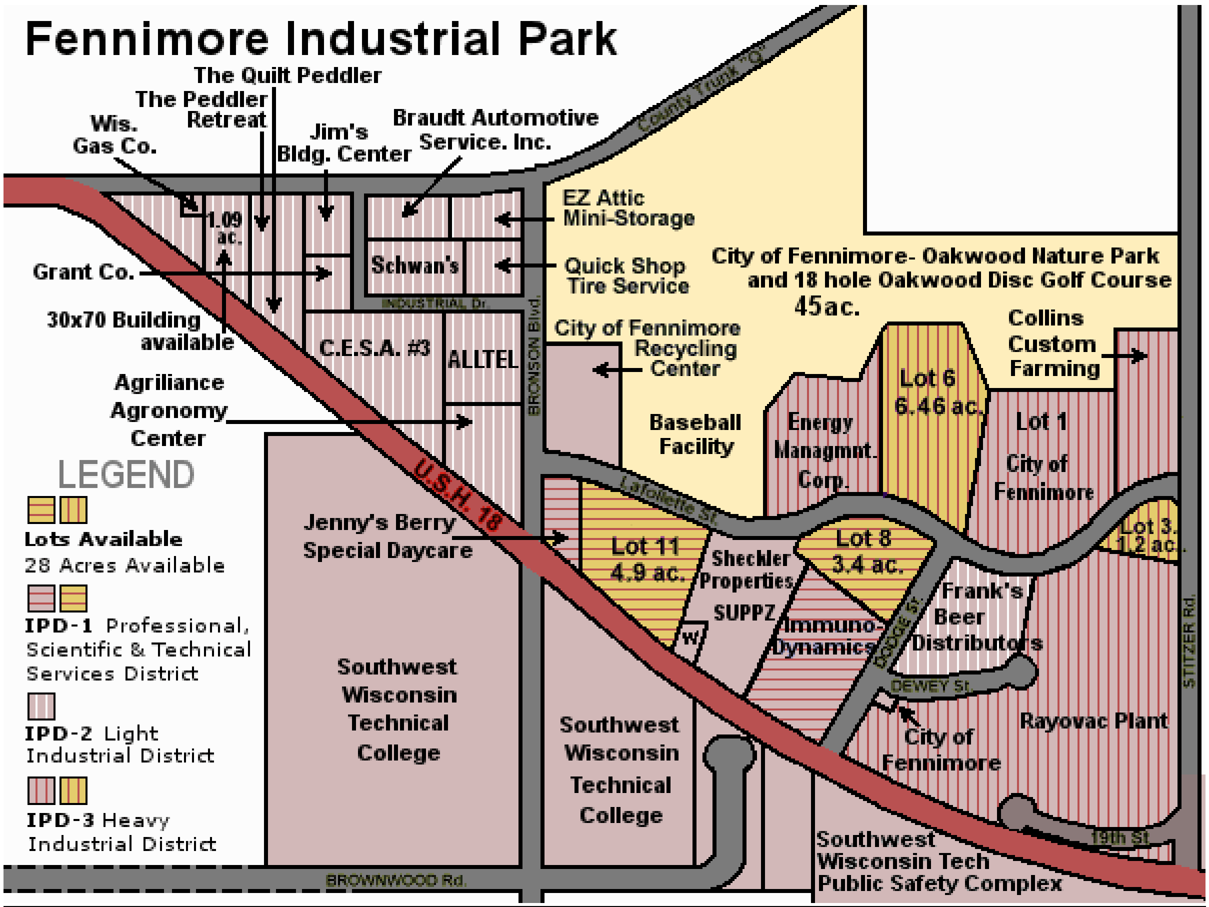




EXISTING LAND USE
AND FUTURE DEVELOPMENT
CITY OF FENNIMORE
GRANT COUNTY, WISCONSIN
N
SCALE: 1" = 400'
0 200 400 800 1200 1600
FUTURE RESIDENTIAL
FUTURE COMMERCIAL
FUTURE RESIDENTIAL
FUTURE RESIDENTIAL
SCHOOL SPORTS FIELD
HIGH SCHOOL
MARSDEN PARK
ELEMENTARY SCHOOL
CITY HALL
CITY GARAGE
FOXMOOR HEIGHTS GREENWAY
FARMSTEAD
OAKWOOD NATURE PARK
CAMPGROUND
SOUTHWEST WISCONSIN TECHNICAL COLLEGE
LEGEND
Single-Family Residential
Two-Family Residential
Multi-Family Residential
Mobile Home Park
Commercial
Industrial
Public / Governmental
Park / Recreation / Conservancy
Vacant / Agricultural
Well
Water Tower
Lift Station
MAP H.1
SOUTHWESTERN WISCONSIN
REGIONAL PLANNING COMMISSION

Fennimore Industrial and Economic Development Corporation

850 Lincoln Ave., Fennimore WI 53809   608-822-3599 or 1-800-822-1131



Property Description:

Ownership - the City of Fennimore owns the industrial property. The Fennimore Industrial and Economic Development Corporation (FIEDC) serves as the marketing arm for the city. FIEDC actively seeks new industry and stands willing to offer their assistance.

Size - The 65-acre industrial park has 16 acres currently available for development. The Park is fully developed with underground water, sewer, and electric service to the property line. All streets have curb and gutter and are paved with asphalt cement bituminous pavement.

Location - The Industrial Park is conveniently located on U. S. Hwy 18, on the City's East Side. U. S. Hwy 61 is located within a mile from the Park.

Incentives - FIEDC and the Fennimore City Council offer land incentives based on the cost of business development and taxable value of property. Please call 608-822-3599 to discuss details. Several other regional incentives may also be available.

Schools - Southwest Tech is adjacent to the Park and offers customized labor training.

Zoning:

IPD-1 Professional, Scientific & Technical Services District
District is intended to provide for professional office and service businesses. This District is intended to specifically encourage the planned development of the industrial park setting for small to medium sized businesses. Permitted uses are those identified in the North American Industry Classification System (NAICS) Professional, Scientific and Technical Services #51---5419 codes.

IPD-2 Light Industrial District
District is intended to provide for professional office, manufacturing and service businesses. This district is intended specifically to encourage the planned development of the industrial park setting for small to medium sized businesses including all permitted uses and structures in the IPD-1 District. Professional, manufacturing and services uses and/or structures including, but not limited to, the following: distribution terminals, government facilities, light fabrication, packing and assembly of products, specialized trades, transportation services, warehousing.

IPD-3 Heavy Industrial District
District is intended to provide for industries which require large sites, which may require extensive buffering, and which are of a character involving open storage or manufacture of equipment materials and other products.

Complete zoning information is available from the Fennimore City Clerk 608-822-6119 or Dennis Biddick, Director of Public Works 608-822-6501. Office hours are from 7:30 a.m. to 4:30 p.m. Monday through Friday.

Utilities:

Fennimore Municipal Utilities offers highly competitive rates for sewer, water and electrical services that can save substantial operating dollars.

Water System - The Park has a new water tower with a 300,000 gallon storage capacity, 12" diameter mains, 2,300+gpm; static water pressure is 55psi.

Sanitary Sewer System - The Fennimore wastewater treatment facility has a design capacity of 620,000 gallons per day, operating hydraulically at 50% capacity, with 8" and 10" mains.

Natural Gas - Wisconsin Power and Light provide Natural gas with 40" diameter mains serving the area. The pressure is 60 psi.

Electric - Fennimore owns their own municipal utilities service which allows Fennimore to offer highly competitive electric rates.

Telecommunications Provider - TDS Telecom is the local telecommunications provider. TDS offers quality communication services, which link our community and Industrial Park to global markets with copper and fiber optics telecommunications. TDS Telecom offers High-Speed Internet and Data services including high speed DSL service. TDS Telecom also offers Centrex capabilities to small and large business systems.

For more information, please contact the Fennimore Industrial and Economic Development office at
850 Lincoln Ave., Fennimore WI 53809; 608-822-3599 or toll-free at 1-800-822-1131.

APPENDIX D

Tertiary Filter Evaluation

MEMORANDUM

Date: February, 2013

To: City of Fennimore

From: Ben Heidemann, Town and Country Engineering, Inc.

Subject: WWTP Tertiary Filter Evaluation

The City Council of Fennimore requested that Town and Country Engineering, Inc. work with Denise Dabson, wastewater superintendent, to evaluate the condition of their existing tertiary filter at the wastewater treatment plant (WWTP). Michael Cullen, P.E. and I visited the WWTP on February 5, 2012 to inspect the filter and evaluate its future use at the plant. The following is a summary of our findings.

Filter History:

The existing WWTP as it is currently configured was constructed in 1977-1978, which included installation of the existing tertiary filter. The filter was designed for total suspended solids removal (TSS) downstream of the rotating biological contactors (RBC's) and final clarifiers which are used for biological treatment. The effluent from RBC's can be high in suspended solids necessitating the use of a tertiary filter.

In the 1990's the Wisconsin DNR began to require phosphorus removal to 1.0 mg/L levels of concentration. The existing filtration system has aided (along with chemical addition) in meeting these phosphorus limits. Typically mechanical equipment used at WWTP's can have an expected useful life of 10-30 years with an overall average of a 20 year life. After that time it is generally expected that the equipment will need a major upgrade or complete replacement. The tertiary filter at the Fennimore facility has operated nearly continuously for over 30 years, and therefore can be expected to have significant wear.

In recent years there has been failure of minor mechanical components such as valves and actuators, which have been replaced, and deterioration of the filter structure mainly due to rust. The largest issue associated with rusting has been the development of leaks along the perimeter of the filter base. These leaks appear to have formed between the steel base plate and wall of the filter. Because of the apparent rust issues, Denise and the City had fears that the interior of the filter could have major deterioration of the metal that would result in structural failure of the equipment.

Inspection Findings:

To complete the inspection one of the four filtration chambers was taken out of service and drained. The under drain (lower chamber) of the filter was accessed through a small manhole located at the base of the filter, while the filter bed(upper area) was accessed from the top by physically removing the filter media with a septic truck.

Visual inspection of the under drain of the filter showed the structural members and most steel to be in good condition with little noticeable deterioration. Original paint appeared to be uncompromised and in good condition. Rust was observed at joints and around welds but nothing significant was noted. We weren't able to observe the base of the filter because 4 inches of water remained within the chamber during the inspection. This was a result of water coming from a leaking valve and from an adjacent filter bed through the air scour pipe. It's assumed that the wall/base joint is in need of repair due to the leaking observed on the exterior of the tank at this general location. The original plans show details of this general location and are attached to this document.

The submerged area of the upper filter bed was also found to be in good condition with painted surfaces uncompromised. Similarly diffusers which connect the filter bed to the under drain appeared to be in good shape. Again the only observed rust within the upper submerged filter bed was at weld joints. Above this normally submerged area where the structure has been exposed to high moisture and air it was observed that the paint was compromised and the metal rusting.

The exterior of the filter appears to have the most significant deterioration. It is apparent that significant rusting has occurred in areas where the paint has failed. As discussed before, the most noticeable rust (and likely the areas with the largest issues) is around the base of the filter where rust has compromised the seal between the base plate and filter wall. It was difficult to closely inspect some areas of the exterior filter due to existing piping and valves obstructing access.

Options for Repair:

The interior structural integrity of the submerged portions of the filter (submerged filter bed and under drain) is in relatively good condition and does not exhibit significant corrosion with the exception of the corner of the base at the exterior wall. The major problem areas are corrosion on the exterior of the filter, corrosion around the base of the filter, rust formation on metal components interior to the filter structure but above the normal water line, and wear on the valves and actuators. The City is faced with repairing the existing filter or replacing it with a new unit which will obviously be more costly but which may have additional capacity to accommodate future regulatory limits.

Although the filter is in better condition that thought previous to the inspection, repair will be somewhat difficult. Repairs to the filter should address each of the deficiencies listed above. In general all corroded areas will have to have rust removed; repairs made as required; all impacted surfaces blasted or sufficiently abraded; and new epoxy coating applied to the surfaces.

Repairs to the under drain compartments should be undertaken first since new metal will most likely have to be welded to the perimeter base to reinforce the existing structure wall. In order to access this area the existing man way ports, which include a 12” by 16” opening, will have to be removed and replaced with 24” diameter man ways. This will have to be done for all four filter cells. Any leaking valves or pipes associated with any cell will also have to be repaired to prevent water from entering the under drain area.

Once a new man way has been installed for any one cell, the interior wall and base will have to be brush blasted to allow for a more thorough inspection. This inspection will reveal how much existing metal will have to be replaced or reinforced and unfortunately an exact determination of needed repairs will not be possible until after repair work is undertaken. At the very least it’s estimated that new angle iron reinforcement will have to be welded to the wall/base intersection and continuous weld made to each angle leg. Continuous welding along any lap joints is critical for minimizing future corrosion. Once interior repair work has been completed the repair work can be blasted or sufficiently abraded and prepared surfaces provided with a new epoxy coating system.

Once the repairs to the under drain area are completed the exterior structure and piping and interior filter area can be blasted and coated. This will require the removal of exterior piping and valves to thoroughly prepare all surfaces which may require temporary piping to be installed. Once again an initial brush blast should be done to allow for an in depth inspection. Significant rust pitting and unwelded lap joints can be repaired with the application of an epoxy repair material or new material welded as needed. After any repairs the impacted surfaces can be provided with an epoxy coating system.

Finally, the valves, actuators, and piping should be replaced as needed. Many of the valves and actuators are original to the filter, and therefore are over 30 years old. Denise has already begun to replace some valves and actuators as they are failing, but is having trouble finding parts due to the age of the system. Optimally all valves and actuators will be replaced to allow for uniform parts supply in the future.

A final item for consideration in repair of the filter (which may add to the cost) is that the existing facility is unable to meet current regulations without the use of the filter. Denise has been sampling the wastewater upstream and downstream of the filter for approximately two months. In that time the pre-filtered water has been at or above the City’s permit limit. Therefore to perform repairs to the filter only 1-2 filter beds may b**e taken out of service at a time.**

Future Considerations:

Future regulations may play a significant part in the decision making regarding repair versus replacement of the existing tertiary filter. The City should be receiving a new permit within 1-2 months. In that permit the DNR will be outlining new regulations for phosphorus treatment which the City will have to comply within the next 7-9 years. These new phosphorus regulations will require the City to reduce their phosphorus discharge tenfold; from 1.0 mg/L down to 0.075 mg/L. This level of treatment is expected to be extremely difficult for facilities to achieve and has never been done prior in the state of Wisconsin. Generally facilities will have four options for complying with these new regulations: installation of new treatment equipment; water quality trading; adaptive management; and an economic variance.

Denise has begun to pilot increased chemical dosage and the effects on the phosphorus removal performance. Short term results of this testing show for a 25% increase in chemical dose decreased effluent phosphorus to 0.5 mg/L. It is highly recommended to continue this testing to determine the ultimate level of phosphorus removal achievable with the existing filter. Generally it is assumed that a traditional shallow bed sand or anthracite filters, like the existing filter, will not be able to achieve 0.075 mg/L.

Water quality trading involves the City working with agriculture land holders and storm water dischargers upstream of the WWTP outfall to reduce phosphorus runoff. Because the Fennimore WWTP is located at the headwater of the receiving stream this is likely a limited option, although it should still be evaluated. DNR may consider downstream trades in the future and this would be evaluated if feasible. Similarly adaptive management involves working with these same entities to improve water quality in the receiving stream. Unfortunately the City of Fennimore does not qualify for adaptive management as a result of being located on the headwaters of the stream.

The final option is an economic variance. In order to qualify for this variance the City will have to undertake a study to determine if compliance with the new permit limits will require an average user charge which exceeds 2% of the City's median household income (MHI). A preliminary research of published data shows that the City's MHI is $45,282, and applying the 2% criteria would result in a total user charge greater than $75/month.

The existing tertiary filter as it is now configured will most likely not be able to remove phosphorus to the future limits. Therefore in deciding how best to fix the problems with the existing filter consideration must be given to potential future expenses and how best to minimize these costs. The City has three potential alternatives for dealing with these issues and are summarized as follows:

1. Repair the existing filter and postpone planning for future limits.

2. Undertake additional evaluation and planning to determine if the existing filter could be modified to achieve future phosphorus limits, and make repairs to the filter with allowances for future equipment changes. This would require pilot testing different filter configurations, media depth, and media material (sand, dual media, coated sand, etc) using the existing filter and compare costs with installation of new tertiary filtration technologies. This alternative would begin the evaluation outlined in Year 2-4 of your permit.
3. Replace the existing filter with a new tertiary filtration system which would not only meet existing limits but will comply with future removal requirements.

The first option will be the least costly but will also only provide the City with three years of use before a facilities planning will be due to implement additional technology to comply with future limits. The second option expedites some of the planning that will be required in the future and also keeps open the possibility of incorporating filter modifications into the initial repair work which may save the City money in the long run. The third option has the most capital cost but will provide a positive strategy for accommodating future regulatory requirements while providing an equipment installation with the longest design life.

Repair Costs:
An estimate of the cost to repair the existing filter and address the issues that have been identified is attached. It is expected to cost between $125,000 and $175,000 to repair the filter as described above. Because access to the filter is limited, the work requires staging, and the working conditions are tight a large contingency was added to the estimate.

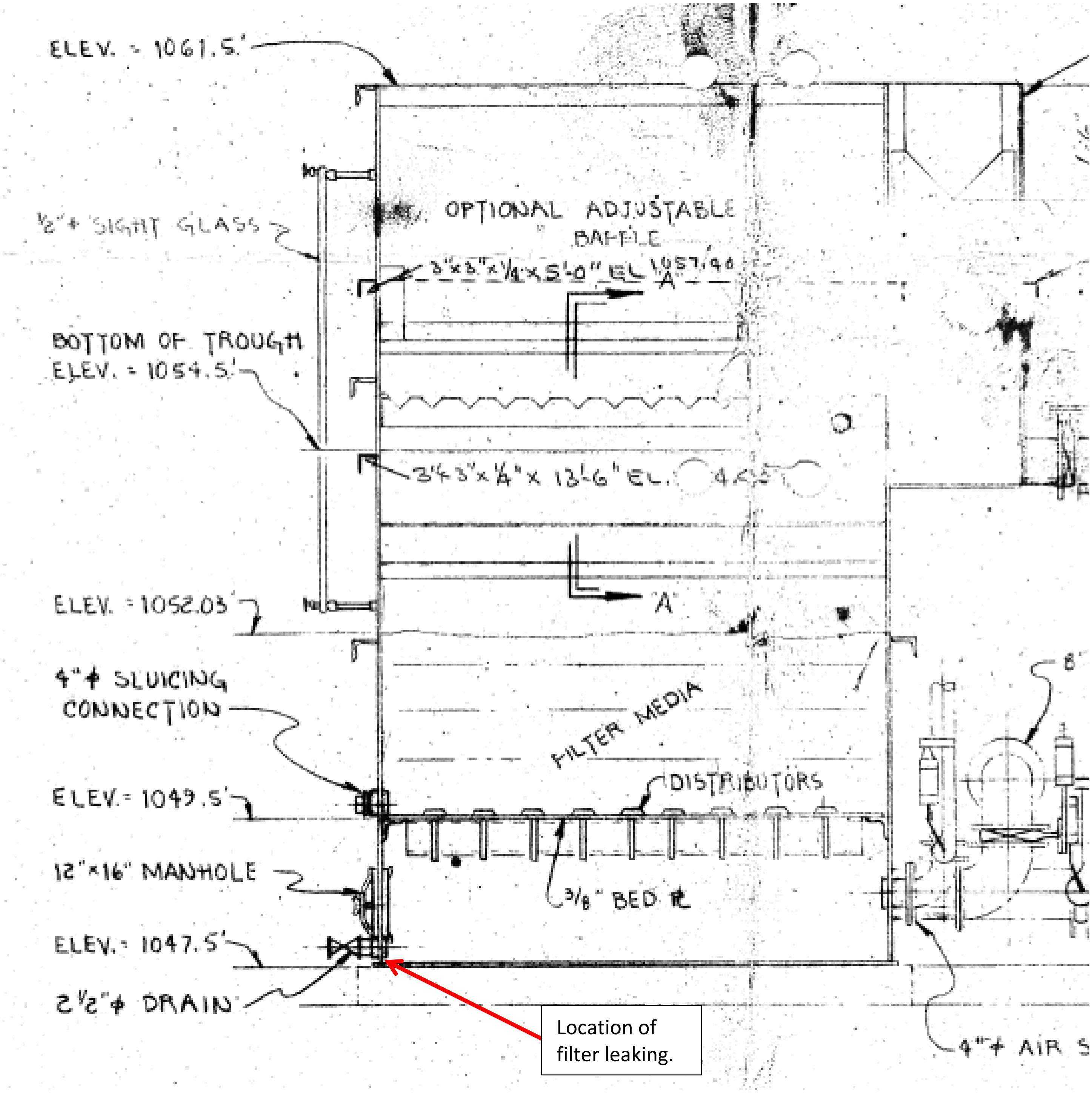
Recommendations:
The City of Fennimore undertook this study to evaluate the structural integrity of their existing filter. The filter appears to be in better condition than previously thought; although the structural integrity cannot be guaranteed. It is likely that the filter could continue in its existing service without major repair until it is determined how best to comply with the future phosphorus limits. If the filter is not repaired the leaking will continue and likely begin to worsen; resulting in a damp, messy work environment.

Because the filter does not appear to be in need of immediate structural repair it is likely not in the City's best interest to spend significant capital dollars to undertake repairs to fix the filter in its existing configuration. It is recommended that the City begin to evaluate options for complying with the future phosphorus limits that are in your upcoming permit. Proceeding with further evaluation of phosphorus removal will allow the City to evaluate re-use of the existing filter with significant modifications, versus installation of a new filter to meet the new regulations that will be imposed in this upcoming permit. Completing this evaluation now will also provide the City with a plan to move forward in the event that significant issues arise with the existing filter. Evaluating and planning for these future phosphorus limits as described in alternative 2 would be the recommended alternative.

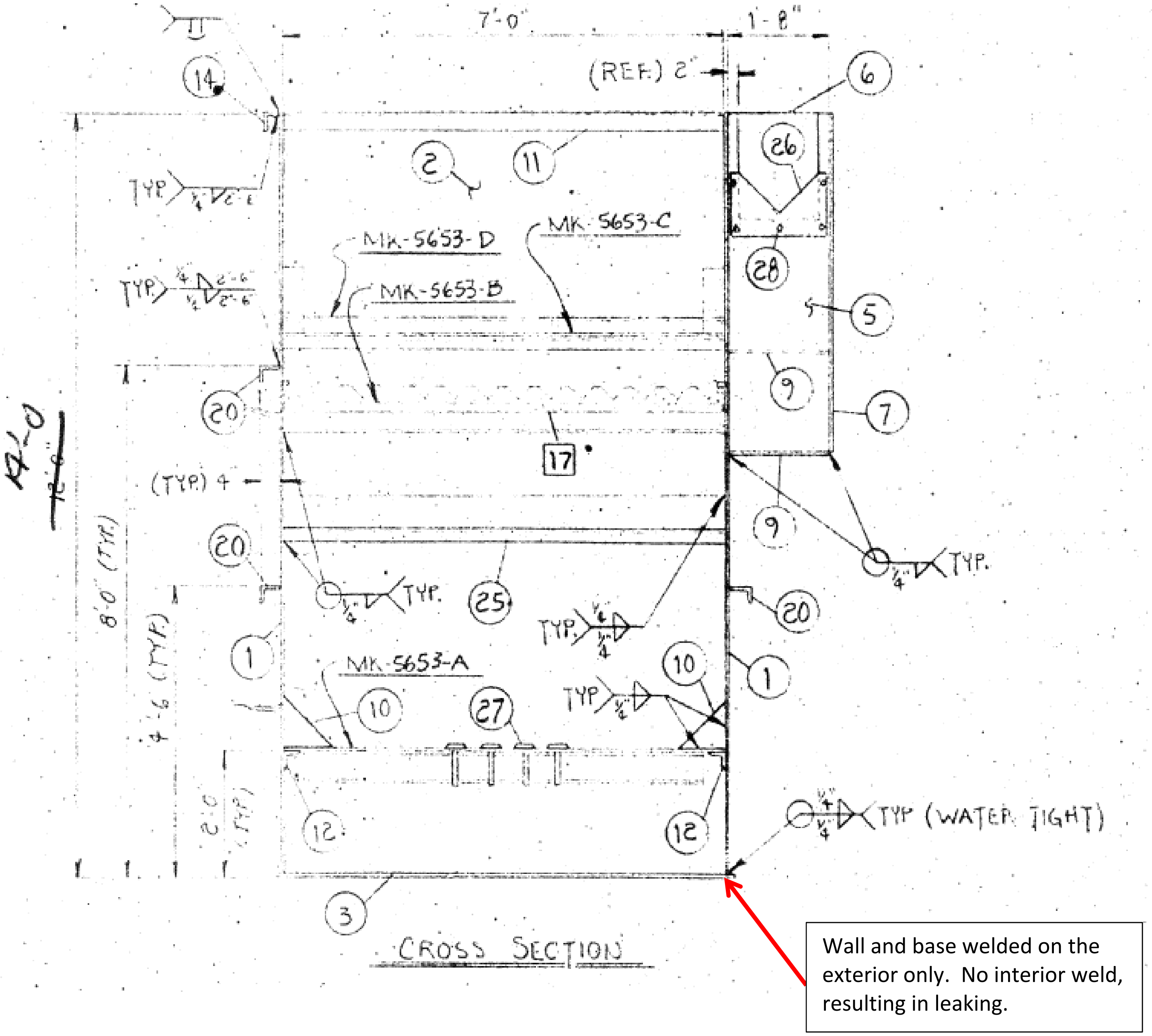
City of Fennimore
Tertiary Filter Evaluation
Repair Cost Estimate

Item	QTY	Unit	Unit Cost	Install Factor	Installed Cost
Structural Repairs					
Media removal	420	CF	$1	1.00	$420
Access port removal	4	EA	$500	1.00	$2,000
Underdrain drying	4	EA	$250	1.00	$1,000
Pipe removal	1	LS	$2,500	1.00	$2,500
Initial brush blast for inspection					
Filter chamber	1,250	SF	$3.00	1.00	$3,750
Underdrain	600	SF	$5.00	1.00	$3,000
Filter exterior	900	SF	$2.00	1.00	$1,800
New welding/sealing	104	LF	$20.00	1.00	$2,080
Final sand blasting					
Filter chamber	1,250	SF	$3.50	1.00	$4,375
Underdrain	600	SF	$6.00	1.00	$3,600
Filter exterior	900	SF	$2.50	1.00	$2,250
Painting					
Filter chamber	1,250	SF	$8.00	1.00	$10,000
Underdrain	600	SF	$10.00	1.00	$6,000
Filter exterior	900	SF	$6.00	1.00	$5,400
Media installation	420	CF	$1	1.00	$420
Manholes	4	EA	$2,500	1.00	$10,000
Mechanical Repairs					
Valves	16	EA	$700	1.20	$13,440
Actuators	16	EA	$500	1.20	$9,600
Pipe fittings	16	EA	$500	1.20	$9,600
Paint	120	LF	$7.50	1.00	$900
Construction Subtotal					**$92,135**
Contractor Management Cost		10%			$9,214
Total Contractor Cost					**$101,348.50**
Contingency		25%			$25,337.13
Engineering and Administration		15%			$15,202.28
Total Cost					**$141,887.90**

Filter Cross Section:



Filter Weld Detail:

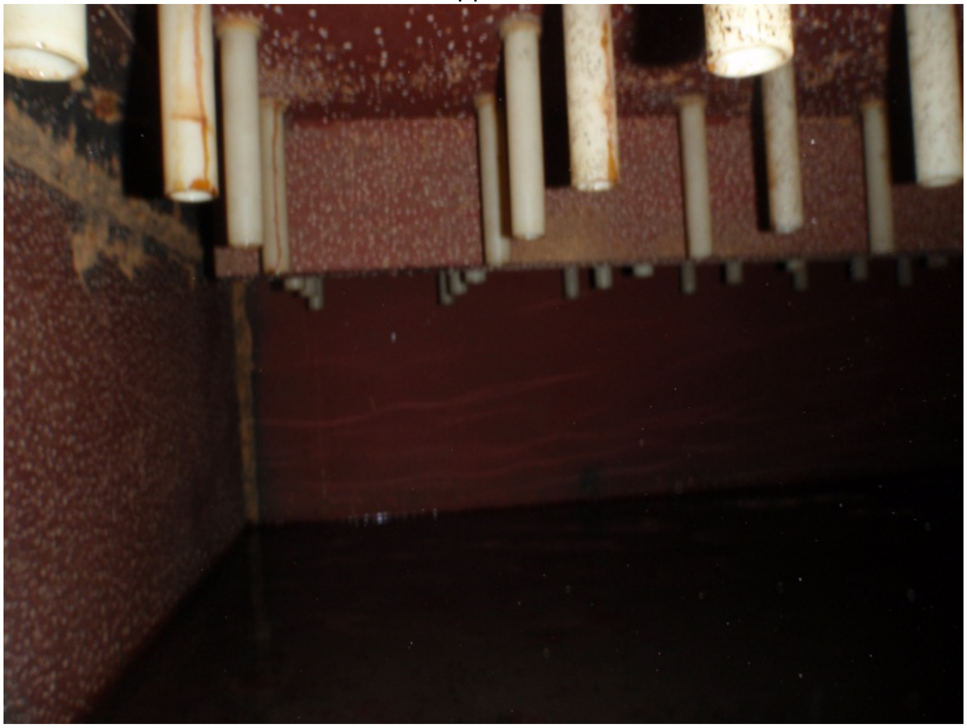


City of Fennimore, WI
WWTP Tertiary Filter Inspection
Summary of Pictures

Pictures 1: Filter underdrain wall. Original red paint appears to be intact. It should be noted that continuous leaking was occurring from other filter beds through air piping.

Picture 2: Filter distributors appear to be intact. Original red paint appears to be intact. White spots appear to be mineral buildup.

Picture 3: Filter distributors and structural elements appear to be intact. Minor rust can be seen in corner welds.



Picture 4: Far end of underdrain; backwash, effluent, and air scour piping. Leaking can be seen in center air scour piping.

Picture 5: Apparent minor rusting occurring at weld joints in underdrain.

Pictures 6: Access manhole. Exterior of all manholes exhibiting significant rusting. Manhole too small for full access to underdrain. If any work is to be completed on the underdrain area the manhole will require replacement.

Picture 7: Apparent rust deteriorating the interior of the manhole

Pictures 8: Rust can be seen at the base of the filter in the pipe gallery on the east side of the filter. Piping makes accessing the exterior filter base difficult.

Picture 9: Cast iron pipe fittings show signs of rust and require re-painting or replacement.

Picture 10: Rust can be seen at the base of the filter in the pipe gallery on the east side of the filter. Piping makes accessing the exterior filter base difficult.

Picture 11: Rust can be seen at the base of the filter in the on drain side (west). Rust has caused the most significant deterioration and leaking along the west filter base.

Picture 12: Close up of rust along west side filter base.

Picture 13: Second close up of rust along west side filter base. Leaking can be seen in this picture.

Pictures 14: Rust on the exterior of filter along welds on inlet box and interior backwash trough.

Picture 15: Rust on the exterior of the filter along welds on the inlet box.

Picture 16: Rust on the northeast corner of the filter above horizontal structural member.

Picture 17: Rust on the northeast corner of the filter above the base.

Picture 18: Pipe gallery along the east side of the filter. Rust can be seen on the exterior of the filter and cast iron tee fittings.

Picture 19: Rusting valve and valve actuator (piston).

Picture 20: Base of submerged filter bed. Black paint and diffusers appear to be intact with little deterioration.

Picture 21: Corner of filter bed at air/water interface (normal water operating level).

Picture 22: Close up of air/water interface on interior of filter. Minor rust apparent along welds.

Picture 23: Close up of filter bed base and wall joint. No apparent rust and paint appears to be intact.

Appendix E

Water and Sewer Use Data

- **Water Use Data**
- **Billed Sewer Flow Data**

City of Fennimore
Water Use Summary
Monthly Pumpage and Consumption

2009	Days	Residential	Commercial	Industrial	Public	Other/Losses*	Total Pumped	
		Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	3,045,590	1,578,570	467,900	227,210	1,810,730	7,130,000	0.230
February	28	3,086,870	1,307,210	702,300	364,540	1,599,080	7,060,000	0.252
March	31	2,638,360	1,103,280	249,000	301,500	1,787,860	6,080,000	0.196
April	30	3,014,960	1,275,420	271,800	342,840	2,532,980	7,438,000	0.248
May	31	2,941,990	1,308,550	385,800	431,830	2,546,830	7,615,000	0.246
June	30	3,201,000	1,320,130	583,640	653,420	2,251,810	8,010,000	0.267
July	31	3,216,660	1,345,120	569,860	603,030	2,241,330	7,976,000	0.257
August	31	3,059,260	1,286,490	681,200	892,840	3,846,210	9,766,000	0.315
September	30	3,128,270	1,305,800	606,220	612,530	3,035,180	8,688,000	0.290
October	31	3,073,830	1,308,000	389,380	463,890	3,460,900	8,696,000	0.281
November	30	2,969,150	1,233,040	272,600	447,490	4,322,720	9,245,000	0.308
December	31	3,175,490	1,177,130	238,500	366,730	3,646,150	8,604,000	0.278
Total	365	36,551,430	15,548,740	5,418,200	5,707,850	33,081,780	96,308,000	
Daily Average		100,141	42,599	14,844	15,638		263,858	0.264
Max							9,766,000	0.315
Min							6,080,000	0.196
		Population**	Customers	Customers	Customers			
Count		2,334	139	3	66		Average Usage	
GPCD		43	306	4,948	237		0.173	MGD

*Water losses due to numerous main breaks and water tower repair
**Population from PSC Report

2010	Days	Residential	Commercial	Industrial	Public	Other/Losses*	Total Pumped	
		Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	3,327,490	1,188,350	182,800	294,530	4,371,830	9,365,000	0.302
February	28	3,401,570	1,282,145	302,900	507,590	4,074,795	9,569,000	0.342
March	31	2,548,070	1,165,275	241,110	382,200	4,341,345	8,678,000	0.280
April	30	3,045,100	1,342,850	275,590	405,540	5,302,920	10,372,000	0.346
May	31	2,928,390	1,305,500	339,500	539,140	859,470	5,972,000	0.193
June	30	3,418,040	1,522,080	587,800	1,065,270	173,810	6,767,000	0.226
July	31	3,104,270	1,407,660	587,180	778,050	1,088,840	6,966,000	0.225
August	31	3,180,730	1,338,230	686,920	841,660	1,006,460	7,054,000	0.228
September	30	3,281,200	1,486,230	633,500	497,290	198,780	6,097,000	0.203
October	31	2,899,150	1,243,160	426,000	405,530	768,160	5,742,000	0.185
November	30	3,216,570	1,426,960	667,500	431,410	670,560	6,413,000	0.214
December	31	2,915,250	1,456,900	361,600	414,760	1,372,490	6,521,000	0.210
Total	365	37,265,830	16,165,340	5,292,400	6,562,970	24,229,460	89,516,000	
Daily Average		102,098	44,289	14,500	17,981		245,249	0.246
Max							10,372,000	0.346
Min							5,742,000	0.185
		Population**	Customers	Customers	Customers			
Count		2,497	137	3	66		Average Usage	
GPCD		41	323	4,833	272		0.179	MGD

*7 service leaks and 4 water main breaks in 2010
**Population from 2010 Census

City of Fennimore
Water Use Summary
Monthly Pumpage and Consumption

2011	Days	Residential	Commercial	Industrial	Public	Other/Losses*	Total Pumped	
		Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	3,351,350	1,854,650	276,100	321,840	717,060	6,521,000	0.210
February	28	3,247,380	2,001,750	553,900	416,000	179,970	6,399,000	0.229
March	31	2,657,150	1,645,550	288,600	403,590	848,110	5,843,000	0.188
April	30	3,063,540	2,076,430	331,900	406,630	2,162,500	8,041,000	0.268
May	31	2,971,300	1,732,170	392,600	402,890	1,997,040	7,496,000	0.242
June	30	3,286,360	1,616,120	621,800	941,760	2,355,960	8,822,000	0.294
July	31	3,440,510	1,640,790	684,900	512,570	1,827,230	8,106,000	0.261
August	31	3,329,570	1,194,480	718,200	557,440	1,322,310	7,122,000	0.230
September	30	3,103,830	1,199,080	654,800	464,760	1,109,530	6,532,000	0.218
October	31	3,021,620	1,215,790	368,600	401,190	544,800	5,552,000	0.179
November	30	3,009,080	1,227,050	324,300	393,740	946,830	5,901,000	0.197
December	31	2,899,550	1,198,890	287,800	363,030	524,730	5,274,000	0.170
Total	365	37,381,240	18,602,750	5,503,500	5,585,440	14,536,070	81,609,000	
Daily Average		102,414	50,966	15,078	15,303		223,586	0.224
Max							8,822,000	0.294
Min							5,274,000	0.170
		Population	Customers	Customers	Customers			
Count		2,500	137	3	66		Average Usage	
GPCD		41	372	5,026	232		0.184	MGD

*6 main breaks and 2 service breaks in 2011
**Population based on 2010 Census plus 2-3 per year to reach DOA 2014 estimate of 2,507

2012	Days	Residential	Commercial	Industrial	Public	Other/Losses*	Total Pumped	
		Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	2,857,190	1,222,360	235,000	232,550	1,006,900	5,554,000	0.179
February	29	3,101,455	1,160,440	294,900	406,780	457,425	5,421,000	0.187
March	31	2,763,780	1,077,580	290,600	635,910	639,130	5,407,000	0.174
April	30	2,914,410	1,202,440	540,600	376,210	1,162,340	6,196,000	0.207
May	31	2,852,360	1,131,420	412,000	353,200	1,158,020	5,907,000	0.191
June	30	3,482,280	1,425,524	598,400	1,015,348	1,085,448	7,607,000	0.254
July	31	3,503,494	1,398,592	678,000	846,128	1,902,786	8,329,000	0.269
August	31	3,486,216	1,273,844	734,300	728,036	224,604	6,447,000	0.208
September	30	3,129,504	1,156,293	535,000	765,488	564,715	6,151,000	0.205
October	31	2,896,904	1,135,138	288,700	449,560	609,698	5,380,000	0.174
November	30	3,105,295	1,158,454	437,600	483,674	607,977	5,793,000	0.193
December	31	3,000,867	997,797	302,500	373,294	302,542	4,977,000	0.161
Total	366	37,093,755	14,339,882	5,347,600	6,666,178	9,721,585	73,169,000	
Daily Average		101,349	39,180	14,611	18,214		199,915	0.200
Max							8,329,000	0.269
Min							4,977,000	0.161
		Population**	Customers	Customers	Customers			
Count		2,502	137	3	66		Average Usage	
GPCD		41	286	4,870	276		0.173	MGD

*No major losses reported
**Population based on 2010 Census plus 2-3 per year to reach DOA 2014 estimate of 2,507

City of Fennimore
Water Use Summary
Monthly Pumpage and Consumption

2013	Days	Residential	Commercial	Industrial	Public	Other/Losses*	Total Pumped	
		Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	3,066,471	1,027,981	240,500	187,299	511,749	5,034,000	0.162
February	28	3,124,406	1,019,643	292,000	382,801	352,150	5,171,000	0.185
March	31	2,785,957	1,017,410	222,400	319,270	321,963	4,667,000	0.151
April	30	3,055,287	1,136,310	200,500	384,741	975,162	5,752,000	0.192
May	31	3,131,443	1,234,183	318,400	366,588	136,386	5,187,000	0.167
June	30	3,175,064	1,214,593	469,700	957,521	323,122	6,140,000	0.205
July	31	2,793,969	1,210,697	601,700	829,106	466,528	5,902,000	0.190
August	31	3,495,487	1,277,059	625,600	723,663	652,191	6,774,000	0.219
September	30	3,218,567	1,156,867	808,300	770,179	1,109,087	7,063,000	0.235
October	31	3,037,730	1,152,521	375,500	706,072	403,177	5,675,000	0.183
November	30	3,052,301	1,050,809	341,900	392,065	307,925	5,145,000	0.172
December	31	2,859,791	1,010,592	309,800	362,723	404,094	4,947,000	0.160
Total	365	36,796,473	13,508,665	4,806,300	6,382,028	5,963,534	67,457,000	
Daily Average		100,812	37,010	13,168	17,485		184,814	0.185
Max							7,063,000	0.235
Min							4,667,000	0.151
		Population**	Customers	Customers	Customers			
Count		2,505	139	3	67		Average Usage	
GPCD		40	266	4,389	261		0.168 MGD	

*No major losses reported
**Population based on 2010 Census plus 2-3 per year to reach DOA 2014 estimate of 2,507

From Commercial/Industrial Water Consumption Records:

Year	Spectrum Brands (gal/year)	The Butcher Shop (gal/year)	Immuno Dynamics (gal/year)	**Industrial Total (gal/year)**	**Commercial Total (gal/year)**	**Annual Total (gallons)**
2012	4,970,000	204,800		5,174,800	15,265,311	20,440,111
2013	4,379,500	254,100	165,400	4,799,000	14,130,776	18,929,776
2014	4,952,300	195,821	116,700	5,264,821	15,165,042	20,429,863
Average	4,767,267	218,240	141,050	5,079,540	14,853,710	19,933,250
Daily Use (GPD)	13,061	598	386	13,917	40,695	54,612

Estimated BOD and TSS Load at 250 mg/L =						
BOD/TSS (lbs/d)	27.2	1.2	0.8	29.0	84.8	143.1

City of Fennimore
Billed Sewer Flow Summary
Monthly and Average Daily Flows

2009	Days	Residential	Commercial	Industrial	Public	Total Flows	
		Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	3,014,490	868,370	467,900	190,410	4,541,170	0.146
February	28	3,009,300	911,280	702,300	327,740	4,950,620	0.177
March	31	2,622,960	746,980	249,000	270,800	3,889,740	0.125
April	30	2,998,360	877,620	271,800	285,740	4,433,520	0.148
May	31	2,925,090	975,100	385,800	312,930	4,598,920	0.148
June	30	3,181,000	989,830	583,640	424,720	5,179,190	0.173
July	31	3,181,460	1,001,320	569,860	439,630	5,192,270	0.167
August	31	3,018,760	813,190	681,200	592,840	5,105,990	0.165
September	30	3,119,570	875,500	606,220	555,220	5,156,510	0.172
October	31	3,069,530	843,400	389,380	406,380	4,708,690	0.152
November	30	2,961,990	844,000	272,600	389,870	4,468,460	0.149
December	31	3,171,990	1,189,930	238,500	311,730	4,912,150	0.158
Total	365	36,274,500	10,936,520	5,418,200	4,508,010	57,137,230	
Daily Average		99,382	29,963	14,844	12,351	156,540	0.157
Max						5,192,270	0.177
Min						3,889,740	0.125
		Population**	Customers	Customers	Customers		
Count		2,354	132	2	55	Average Flow	
GPCD		42	227	7,422	225	0.157	MGD

Residential Customers 964
**Population from PSC Report

2010	Days	Residential	Commercial	Industrial	Public	Total Flows	
		Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	3,269,090	755,680	182,800	226,430	4,434,000	0.143
February	28	3,388,070	915,145	302,900	432,490	5,038,605	0.180
March	31	2,535,370	775,775	241,110	316,400	3,868,655	0.125
April	30	2,529,100	889,050	275,590	321,740	4,015,480	0.134
May	31	2,915,690	896,000	339,500	438,040	4,589,230	0.148
June	30	3,379,240	1,174,380	588,400	712,070	5,854,090	0.195
July	31	3,090,970	1,024,260	587,180	617,150	5,319,560	0.172
August	31	3,161,530	904,330	686,920	697,560	5,450,340	0.176
September	30	3,268,000	987,230	633,500	459,870	5,348,600	0.178
October	31	2,886,250	839,860	426,000	370,300	4,522,410	0.146
November	30	3,198,870	899,660	667,500	389,830	5,155,860	0.172
December	31	2,902,550	734,000	361,600	373,660	4,371,810	0.141
Total	365	36,524,730	10,795,370	5,293,000	5,355,540	57,968,640	
Daily Average		100,068	29,576	14,501	14,673	158,818	0.159
Max						5,854,090	0.195
Min						3,868,655	0.125
		Population**	Customers	Customers	Customers		
Count		2,517	126	3	52	Average Flow	
GPCD		40	235	4,834	282	0.159	MGD

Residential Customers 987
**Population from 2010 Census

City of Fennimore
Billed Sewer Flow Summary
Monthly and Average Daily Flows

2011	Days	Residential	Commercial	Industrial	Public	Total Flows	
						Gallons	MGD
January	31	3,337,250	884,850	276,100	243,040	4,741,240	0.153
February	28	3,233,580	888,250	553,900	317,000	4,992,730	0.178
March	31	2,645,750	807,610	288,600	321,690	4,063,650	0.131
April	30	3,050,540	996,130	331,900	313,130	4,691,700	0.156
May	31	2,957,900	1,000,280	392,600	301,650	4,652,430	0.150
June	30	3,270,900	1,148,410	621,800	599,660	5,640,770	0.188
July	31	3,422,970	1,103,490	684,900	433,040	5,644,400	0.182
August	31	3,302,270	856,480	718,200	414,940	5,291,890	0.171
September	30	3,088,530	875,380	654,500	349,960	4,968,370	0.166
October	31	2,997,920	856,050	368,600	384,000	4,606,570	0.149
November	30	2,992,680	904,590	324,300	345,980	4,567,550	0.152
December	31	2,884,750	799,390	287,800	308,230	4,280,170	0.138
Total	365	37,185,040	11,120,910	5,503,200	4,332,320	58,141,470	
Daily Average		101,877	30,468	15,077	11,869	159,292	0.160
Max						5,644,400	0.188
Min						4,063,650	0.131
		Population**	Customers	Customers	Customers		
Count		2,520	126	3	52	Average Flow	
GPCD		40	242	5,026	228	0.159	MGD

Residential Customers 987
**Population based on 2010 Census plus 2-3 per year to reach DOA 2014 estimate of 2,507

2012	Days	Residential	Commercial	Industrial	Public	Total Flows	
		Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	2,843,590	847,160	235,000	175,150	4,100,900	0.132
February	29	3,088,555	984,040	294,900	332,180	4,699,675	0.162
March	31	2,750,780	900,480	290,600	320,210	4,262,070	0.137
April	30	2,900,610	957,140	540,600	312,010	4,710,360	0.157
May	31	2,833,860	922,320	412,000	292,800	4,460,980	0.144
June	30	3,454,280	971,627	598,400	818,648	5,842,955	0.195
July	31	3,466,294	900,642	678,000	506,628	5,551,564	0.179
August	31	3,463,314	977,126	734,300	507,136	5,681,876	0.183
September	30	3,110,904	900,551	535,000	576,478	5,122,933	0.171
October	31	2,872,704	935,398	288,700	355,440	4,452,242	0.144
November	30	3,092,695	959,792	437,600	418,874	4,908,961	0.164
December	31	2,984,667	824,214	302,500	307,694	4,419,075	0.143
Total	366	36,862,253	11,080,490	5,347,600	4,923,248	58,213,591	
Daily Average		100,717	30,275	14,611	13,451	159,054	0.159
Max						5,842,955	0.195
Min						4,100,900	0.132
		Population**	Customers	Customers	Customers		
Count		2,522	126	3	52	Average Flow	
GPCD		40	240	4,870	259	0.159	MGD

Residential Customers 987
**Population based on 2010 Census plus 2-3 per year to reach DOA 2014 estimate of 2,507

City of Fennimore
Billed Sewer Flow Summary
Monthly and Average Daily Flows

2013	Days	Residential	Commercial	Industrial	Public	Total Flows	
		Gallons	Gallons	Gallons	Gallons	Gallons	MGD
January	31	3,048,471	914,761	240,500	135,999	4,339,731	0.140
February	28	3,106,706	875,517	292,000	316,201	4,590,424	0.164
March	31	2,770,357	879,481	222,400	275,170	4,147,408	0.134
April	30	3,040,287	973,294	200,500	307,341	4,521,422	0.151
May	31	3,115,956	994,863	318,400	281,236	4,710,455	0.152
June	30	3,159,608	928,998	469,700	703,363	5,261,669	0.175
July	31	2,779,186	878,617	601,700	510,462	4,769,965	0.154
August	31	3,468,206	969,437	625,600	579,207	5,642,450	0.182
September	30	3,205,206	899,297	808,300	602,529	5,515,332	0.184
October	31	3,029,732	944,320	375,500	907,060	5,256,612	0.170
November	30	3,034,067	856,835	341,900	326,165	4,558,967	0.152
December	31	2,843,189	875,421	309,800	279,209	4,307,619	0.139
Total	365	36,600,971	10,990,841	4,806,300	5,223,942	57,622,054	
Daily Average		100,277	30,112	13,168	14,312	157,869	0.158
Max						5,642,450	0.184
Min						4,147,408	0.134
		Population**	Customers	Customers	Customers		
Count		2,525	126	3	52	Average Flow	
GPCD		40	239	4,389	275	0.158	MGD

Residential Customers 987

**Population based on 2010 Census plus 2-3 per year to reach DOA 2014 estimate of 2,507

Summary	**Average Water Usage (MGD)**	**Average Billed Sewer Flow (MGD)**	**Average WWTP Influent Flow (MGD)**	Residential Flow (GPCD)	Commercial Flow (GPCD)	Industrial Flow (GPCD)	Public Flow (GPCD)
2009	0.173	0.157	0.261	42	227	7422	282
2010	0.179	0.159	0.310	40	235	4834	282
2011	0.184	0.159	0.247	40	242	5026	228
2012	0.173	0.159	0.197	40	240	4870	259
2013	0.168	0.158	0.247	40	239	4389	275
Average	0.176	0.158	0.252	40	237	5308	265
				Average (gpd)			
				100,401	30,030	14,398	13,301

Year	Residential Flow (MGD)	Commercial Flow (MGD)	Industrial Flow (MGD)	Public Flow MGD)	Annual Average (MGD)
2009	0.0994	0.0300	0.0148	0.0124	0.157
2010	0.1001	0.0296	0.0145	0.0147	0.159
2011	0.1019	0.0305	0.0151	0.0119	0.159
2012	0.1007	0.0303	0.0146	0.0135	0.159
2013	0.1003	0.0301	0.0132	0.0143	0.158
Average	0.1005	0.0301	0.0144	0.0133	0.158
Percent of Total	63%	19%	9%	8%	100%

Appendix F

Existing WWTF Flow and Loading Data

City of Fennimore WWTP
Annual Averages

2009 - 2014 Summary — **WWTP Influent**

	Annual Average			Flow Minimum Values			Flow Maximum Values			
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Min Day *MGD*	Min Week *MGD*	Min 2-Week *MGD*	Max Day *MGD*	Max Week *MGD*	Max 2-Week *MGD*	Max Month *MGD*
2009	0.261	567	394	0.181	0.198	0.200	0.598	0.404	0.356	0.320
2010	0.310	758	413	0.185	0.200	0.205	1.197	0.651	0.539	0.457
2011	0.247	585	460	0.177	0.192	0.196	0.522	0.437	0.417	0.345
2012	0.197	503	447	0.160	0.176	0.180	0.331	0.229	0.221	0.210
2013	0.247	494	420	0.139	0.154	0.161	0.866	0.626	0.511	0.369
2014	0.251	497	450	0.183	0.194	0.161	0.663	0.406	0.391	0.316
Average	0.252	567	431	0.171	0.186	0.184	0.696	0.459	0.406	0.336
Maximum	0.310	758	460	0.185	0.200	0.205	1.197	0.651	0.539	0.457
AVG (5) Max Values	**0.263**	**582**	**438**	**0.177**	**0.192**	**0.188**	**0.769**	**0.505**	**0.443**	**0.361**
Average w/o Low and High	0.251	538	433	0.175	0.190	0.184	0.662	0.468	0.419	0.337
Average (3 highest)							**0.909**	**0.571**	**0.489**	**0.390**

	Three Highest Months Averages		
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*
2009	0.298	662	475
2010	0.410	917	489
2011	0.325	804	515
2012	0.207	543	474
2013	0.329	532	471
2014	0.290	539	556
Average	**0.310**	**666**	**497**
Maximum	**0.410**	**917**	**556**
AVG (5) Max Values	**0.330**	**693**	**502**
Average w/o Low and High	**0.311**	**637**	**488**

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9/25/2015

City of Fennimore WWTP
Annual Loading Data

2014	**WWTP Influent**			Flow					
	Flow Monthly Average *MGD*	BOD Monthly Average *lbs/d*	TSS Monthly Average *lbs/d*	Min Day *MGD*	Min Week *MGD*	Min 2-Week *MGD*	Max Day *MGD*	Max Week *MGD*	Max 2-Week *MGD*
January	0.211	486	348	0.188	0.198	0.198	0.245	0.222	0.219
February	0.216	480	341	0.183	0.194	0.161	0.274	0.236	0.227
March	0.264	555	367	0.211	0.223	0.226	0.357	0.296	0.289
April	0.281	462	486	0.205	0.225	0.238	0.663	0.380	0.320
May	0.255	505	361	0.238	0.243	0.247	0.321	0.291	0.274
June	0.273	491	446	0.198	0.217	0.227	0.615	0.325	0.316
July	0.316	459	481	0.253	0.264	0.270	0.482	0.406	0.391
August	0.236	502	486	0.216	0.225	0.230	0.268	0.260	0.267
September	0.230	469	518	0.205	0.222	0.226	0.295	0.241	0.238
October	0.227	559	663	0.199	0.215	0.219	0.332	0.254	0.238
November									
December									
Average Monthly Loading	0.251	496.6	449.8						
High Month 1	0.316	558.7	663.4						
High Month 2	0.281	554.8	517.8						
High Month 3	0.273	504.9	486.3						
Average of 3 High Values	0.290	539.5	555.9						

	Flow	*Month*
Min Day	0.183	February
Sustained Weekly Min	0.194	February
Sustained 2-Week Min	0.161	February
Max Day	0.663	April
Sustained Weekly Max	0.406	July
Sustained 2-Week Max	0.391	July
Max Month	0.316	July
Annual Average	0.251	

City of Fennimore WWTP
Annual Loading Data

2013 **WWTP Influent**

	Flow Monthly Average	BOD Monthly Average	TSS Monthly Average	Flow					
				Min Day	Min Week	Min 2-Week	Max Day	Max Week	Max 2-Week
	MGD	*lbs/d*	*lbs/d*	*MGD*	*MGD*	*MGD*	*MGD*	*MGD*	*MGD*
January	0.195	497	446	0.171	0.180	0.182	0.287	0.219	0.203
February	0.191	480	400	0.144	0.165	0.180	0.314	0.225	0.215
March	0.218	487	448	0.139	0.154	0.161	0.515	0.270	0.232
April	0.301	477	391	0.206	0.221	0.237	0.532	0.390	0.359
May	0.259	539	393	0.220	0.238	0.243	0.363	0.286	0.310
June	0.369	537	381	0.240	0.263	0.266	0.866	0.626	0.479
July	0.316	443	438	0.238	0.249	0.277	0.402	0.482	0.511
August	0.242	491	509	0.213	0.229	0.232	0.271	0.265	0.273
September	0.234	521	401	0.203	0.222	0.229	0.361	0.246	0.245
October	0.215	510	446	0.197	0.205	0.211	0.321	0.232	0.237
November	0.216	496	457	0.197	0.204	0.207	0.268	0.222	0.220
December	0.203	451	333	0.188	0.198	0.200	0.225	0.216	0.214
Average Monthly Loading	0.247	493.9	420.2						
High Month 1	0.369	538.9	509.4						
High Month 2	0.316	536.9	457.2						
High Month 3	0.301	521.1	447.6						
Average of 3 High Values	0.329	532.3	471.4						

	Flow	*Month*
Min Day	0.139	March
Sustained Weekly Min	0.154	March
Sustained 2-Week Min	0.161	March
Max Day	0.866	June
Sustained Weekly Max	0.626	June
Sustained 2-Week Max	0.511	July
Max Month	0.369	June
Annual Average	0.247	

City of Fennimore WWTP
Annual Loading Data

2012	**WWTP Influent** Flow Monthly Average *MGD*	BOD Monthly Average *lbs/d*	TSS Monthly Average *lbs/d*	Flow Min Day *MGD*	Min Week *MGD*	Min 2-Week *MGD*	Max Day *MGD*	Max Week *MGD*	Max 2-Week *MGD*
January	0.200	571	439	0.182	0.192	0.195	0.246	0.215	0.213
February	0.203	524	477	0.181	0.198	0.199	0.239	0.207	0.206
March	0.207	503	441	0.181	0.193	0.195	0.244	0.225	0.221
April	0.205	507	460	0.182	0.188	0.195	0.294	0.222	0.215
May	0.210	534	477	0.188	0.195	0.196	0.282	0.229	0.216
June	0.190	477	451	0.173	0.186	0.188	0.215	0.215	0.211
July	0.190	513	447	0.170	0.179	0.181	0.298	0.209	0.197
August	0.189	472	435	0.170	0.178	0.182	0.205	0.196	0.201
September	0.184	466	450	0.160	0.181	0.184	0.210	0.191	0.190
October	0.202	448	421	0.182	0.179	0.183	0.331	0.219	0.210
November	0.198	497	467	0.171	0.185	0.190	0.260	0.211	0.207
December	0.184	524	396	0.167	0.176	0.180	0.224	0.195	0.191
Average Monthly Loading	0.197	503.0	446.8						
High Month 1	0.210	570.7	477.0						
High Month 2	0.207	534.0	476.7						
High Month 3	0.205	524.3	467.1						
Average of 3 High Values	0.207	543.0	473.6						

	Flow	*Month*
Min Day	0.160	September
Sustained Weekly Min	0.176	December
Sustained 2-Week Min	0.180	December
Max Day	0.331	October
Sustained Weekly Max	0.229	May
Sustained 2-Week Max	0.221	March
Max Month	0.210	May
Annual Average	0.197	

City of Fennimore WWTP
Annual Loading Data

2011	**WWTP Influent**									
	Flow Monthly Average *MGD*	BOD Monthly Average *lbs/d*	TSS Monthly Average *lbs/d*	Flow Min Day *MGD*	Min Week *MGD*	Min 2-Week *MGD*	Max Day *MGD*	Max Week *MGD*	Max 2-Week *MGD*
January	0.215	1,187	436	0.191	0.202	0.204	0.245	0.250	0.235
February	0.246	576	363	0.177	0.194	0.203	0.443	0.343	0.291
March	0.316	555	420	0.239	0.241	0.248	0.522	0.428	0.379
April	0.345	567	484	0.266	0.278	0.287	0.520	0.437	0.406
May	0.314	513	430	0.271	0.283	0.290	0.384	0.429	0.417
June	0.250	440	413	0.225	0.235	0.241	0.298	0.279	0.288
July	0.218	460	496	0.197	0.213	0.216	0.243	0.235	0.240
August	0.217	472	490	0.195	0.203	0.205	0.279	0.238	0.227
September	0.204	530	529	0.182	0.192	0.196	0.255	0.237	0.231
October	0.203	543	480	0.189	0.198	0.201	0.238	0.212	0.208
November	0.216	524	459	0.188	0.200	0.202	0.263	0.238	0.224
December	0.215	649	519	0.192	0.204	0.208	0.263	0.222	0.219
Average Monthly Loading	0.247	584.6	460.0						
High Month 1	0.345	1,187.0	528.6						
High Month 2	0.316	648.6	519.4						
High Month 3	0.314	575.5	496.5						
Average of 3 High Values	0.325	803.7	514.8						

	Flow	*Month*
Min Day	0.177	February
Sustained Weekly Min	0.192	September
Sustained 2-Week Min	0.196	September
Max Day	0.522	March
Sustained Weekly Max	0.437	April
Sustained 2-Week Max	0.417	May
Max Month	0.345	April
Annual Average	0.247	

City of Fennimore WWTP
Annual Loading Data

2010	**WWTP Influent**									
	Flow Monthly Average	BOD Monthly Average	TSS Monthly Average	Flow						
				Min Day	Min Week	Min 2-Week	Max Day	Max Week	Max 2-Week
	MGD	*lbs/d*	*lbs/d*	*MGD*	*MGD*	*MGD*	*MGD*	*MGD*	*MGD*
January	0.287	502	382	0.245	0.260	0.261	0.444	0.354	0.324
February	0.263	699	353	0.244	0.256	0.205	0.296	0.307	0.317
March	0.324	816	280	0.262	0.260	0.259	0.546	0.429	0.375
April	0.317	824	473	0.241	0.261	0.282	0.480	0.402	0.356
May	0.293	792	433	0.245	0.266	0.275	0.435	0.361	0.327
June	0.312	605	383	0.242	0.252	0.263	0.449	0.379	0.355
July	0.419	565	354	0.296	0.318	0.347	0.827	0.610	0.479
August	0.457	879	418	0.341	0.364	0.394	1.197	0.651	0.539
September	0.354	987	456	0.284	0.300	0.309	0.545	0.485	0.436
October	0.255	682	497	0.225	0.244	0.249	0.287	0.292	0.305
November	0.226	885	438	0.206	0.215	0.219	0.251	0.245	0.247
December	0.211	867	498	0.185	0.200	0.205	0.297	0.222	0.219
Average Monthly Loading	0.310	758.5	413.5						
High Month 1	0.457	986.5	497.5						
High Month 2	0.419	884.6	496.8						
High Month 3	0.354	878.6	472.8						
Average of 3 High Values	0.410	916.6	489.0						

	Flow	*Month*
Min Day	0.185	December
Sustained Weekly Min	0.200	December
Sustained 2-Week Min	0.205	Mar/Dec
Max Day	1.197	August
Sustained Weekly Max	0.651	August
Sustained 2-Week Max	0.539	August
Max Month	0.457	August
Annual Average	0.310	

City of Fennimore WWTP
Annual Loading Data

2009	WWTP Influent			Flow					
	Flow Monthly Average *MGD*	BOD Monthly Average *lbs/d*	TSS Monthly Average *lbs/d*	Min Day *MGD*	Min Week *MGD*	Min 2-Week *MGD*	Max Day *MGD*	Max Week *MGD*	Max 2-Week *MGD*
January	0.207	515	340	0.190	0.198	0.200	0.228	0.218	0.213
February	0.237	551	421	0.195	0.204	0.201	0.403	0.288	0.251
March	0.263	613	409	0.222	0.233	0.227	0.384	0.324	0.289
April	0.241	601	460	0.204	0.214	0.219	0.391	0.295	0.254
May	0.239	502	360	0.210	0.227	0.236	0.287	0.300	0.269
June	0.245	499	319	0.181	0.205	0.205	0.474	0.330	0.286
July	0.282	511	544	0.199	0.227	0.235	0.598	0.404	0.339
August	0.320	560	335	0.269	0.299	0.308	0.393	0.392	0.356
September	0.258	487	389	0.236	0.250	0.250	0.301	0.307	0.323
October	0.288	600	379	0.234	0.252	0.252	0.478	0.347	0.324
November	0.270	634	381	0.237	0.249	0.253	0.335	0.348	0.344
December	0.286	738	386	0.240	0.252	0.253	0.519	0.376	0.320
Average Monthly Loading	0.261	567.4	393.6						
High Month 1	0.320	738.1	544.4						
High Month 2	0.288	634.2	460.3						
High Month 3	0.286	612.7	420.7						
Average of 3 High Values	0.298	661.7	475.1						

	Flow	*Month*
Min Day	0.181	June
Sustained Weekly Min	0.198	January
Sustained 2-Week Min	0.200	January
Max Day	0.598	July
Sustained Weekly Max	0.404	July
Sustained 2-Week Max	0.356	August
Max Month	0.320	August
Annual Average	0.262	

Appendix G

Infiltration and Inflow Calculations

City of Fennimore WWTP
Infiltration and Inflow

Annual Averages (MGD)

	WW Flow		City Flow	Annual I/I
2009	0.261		0.157	0.104
2010	0.310		0.159	0.151
2011	0.247		0.159	0.088
2012	0.197		0.159	0.038
2013	0.247		0.158	0.089
2014	0.251		0.159	0.092

Average = **0.094** = Annual Average I/I

Average of 3 Highest Months (MGD)

	WW Flow		City Flow	Annual I/I
2009	0.298		0.157	0.141
2010	0.410		0.159	0.251
2011	0.325		0.159	0.166
2012	0.207		0.159	0.048
2013	0.329		0.158	0.171
2014	0.290		0.159	0.131

Average of the 3 Highest Values = **0.196** = Maximum Month I/I

Sustained Flows (two week averages) (MGD)

	City Billed	Low Flow Periods			High Flow Periods		
		Total WW		I/I	Total WW		I/I
2009	0.157	0.200		0.043	0.356		0.199
	0.157	0.201		0.044	0.344		0.187
2010	0.159	0.205		0.046	0.539		0.380
	0.159	0.205		0.046	0.479		0.320
2011	0.159	0.196		0.037	0.417		0.258
	0.159	0.201		0.042	0.406		0.247
2012	0.159	0.180		0.021	0.221		0.062
	0.159	0.181		0.022	0.216		0.057
2013	0.158	0.161		0.003	0.511		0.353
	0.158	0.180		0.022	0.479		0.321
2014	0.159	0.161		0.002	0.391		0.232
	0.159	0.198		0.039	0.479		0.320
AVG		0.189		0.031	0.403		0.245

Average of the 3 Highest Values = **0.320** = Sunstained I/I
Dry Weather Infiltration = **0.031** = Min Dry Weather I/I

City of Fennimore WWTP
Infiltration and Inflow

Sustained Flows (One week averages) (MGD)

	City Billed	High Flow Periods Total		I/I
2009	0.157	0.404		0.247
	0.157	0.392		0.235
2010	0.159	0.651		0.492
	0.159	0.610		0.451
2011	0.159	0.437		0.278
	0.159	0.429		0.270
2012	0.159	0.229		0.070
	0.159	0.225		0.066
2013	0.158	0.626		0.468
	0.158	0.482		0.324
2014	0.159	0.406		0.247
	0.159	0.380		0.221
AVG		0.439		0.281

Average of the 3 Highest Values = **0.470** = Maximum Weekly I/I

Daily High Flows (MGD)

	High 1	High 2	High 3	AVG		City Flow	Max Day I/I
2009	0.598	0.519	0.485	0.534		0.157	0.377
2010	1.197	0.827	0.772	0.932		0.159	0.773
2011	0.522	0.520	0.460	0.501		0.159	0.342
2012	0.331	0.298	0.294	0.308		0.159	0.149
2013	0.866	0.690	0.677	0.744		0.158	0.586
2014	0.663	0.615	0.482	0.587		0.159	0.428

2nd Largest Value = 0.586
Average without 2012 = **0.501** = Maximum Day I/I

Dry Weather I/I	0.031	MGD
Sustained Wet Weather I/I	0.320	MGD
Maximum Week I/I	0.470	MGD
Maximum Day I/I	0.501	MGD

Notes:
City Flow is billed sewer flow for each year
WW Flow is WWTP influent flow

Appendix H

Summary of Hauled Waste Survey

City of Fennimore
Local Septic and Holding Tank Waste Survey Summary

WWTPs	Septic $/1000 gal	Holding Tank $/1000 gal	Septic Volume gal/year	Holding Tank Volume gal/year	Notes	Main Haulers
Lancaster	$139.00	$27.50	During summer up to 2 loads per day from 3 haulers		Does not take much septage, rates are higher than other plants	Wepking, Kruser, Schmitz
Platteville	$55.00	$10.00	40,000	75,000		Kruser, AA
Boscobel	$48.00	$48.00	140,000	38,000		Boscobel Plumbing (closing), Schmitz, Wepking
Prairie du Chien	$45.00				Rates from Wepking	
Cassville	$22.00	$22.00	100,000 - 120,000 combined		Lowest rates in area, they have excess organic capacity due to cooling water discharge	

Haulers	Septic Volume gal/year	Holding Tank Volume gal/year	Notes	Hauls to
Kruser (Dickeyville)	2,500,000	500,000	Would gladly haul to Fennimore if facilities were available	All over county, has two 0.5 MG slurrystore tanks in Dickeyville and land spreading
Wepking (Lancaster)			Could send 400,000-500,000 per year to Fennimore if reasonably priced, closest hauler at 7 mi from plant	Cassville, Lancaster, Boscobel, can land spread for $33/1000 gal
Schmitz (Bloomington)	495,000	731,000	Would haul to Fennimore, particularly for septage, if available	Cassville & Boscobel for septage, some to Potosi, Bloomington and Lancaster for holding tanks

Other Contacts

Grant County Conservation, Sanitation and Zoning (Jeff Krueger) reports that the county's 9,000 septic tanks are inspected and/or pumped every three years. They estimate that a larger percentage (at least 75-80%) are pumped at each of these maintenance intervals and that there is a need for septage receiving in the area.

Mt. Ida Township and Fennimore Township - Both Chairmen said that all residential and commercial property owners have individual septic systems and that they contract with private haulers as needed to empty the tanks. There is no talk in either township about a sanitary district for groups of homes. They believe there is a need for Fennimore to consider providing capacity in the future for disposal of that waste from private haulers.

Town Chairman for Liberty Township - Chairman agrees that providing capacity for private haulers would be beneficial to residents in the surrounding townships.

Appendix I

Future Loading Projections

Future Loadings Projections - Year 2035 Ultimate Capacity
City of Fennimore WWTP

Peaking Factors Applied to Base Flow (Items 1 and 2)

Maximum Weekly PF	125%
Maximum Daily PF	175%
Peak Hourly PF	250%
2035 Population Projection =	**2,875**

		Data Base Quantity	Data Base Units	Rate	Flow Units	Flow	BOD Rate	BOD Units	BOD Loading	SS Rate	SS Units	SS Loading	TKN Rate	TKN Units	TKN Loading	Phosphorus Rate	Phosphorus Units	Phosphorus Loading
						mgd			lbs/day			lbs/day			lbs/day			lbs/day
1	City Base Loadings																	
	Residential	2,525	capita	56	gpcd	0.141												
	Commercial	126	customer	237	gpcd	0.030												
	Public	52	customer	265	gpcd	0.014												
	General Industrial	3	customer	5,300	gpcd	0.016												
	Annual Average					0.201			567			431	40	mg/l	67	7	mg/l	11.7
	Current Sustained Base Loading					0.201			693			502			67			11.7
2	Future City Increases																	
	Population Growth	350	capita	60	gpcd	0.021	0.22	ppcd	77	0.20	ppcd	70	40	mg/l	7	7	mg/l	1.2
	Commercial Expansion	12	acres	1,000	gpad	0.012	250	mg/l	25	250	mg/l	25	40	mg/l	4	7	mg/l	0.7
	Public Sector Growth	0.75	%	13,300	gpd	0.002	250	mg/l	4	250	mg/l	4	40	mg/l	1	7	mg/l	0.1
	General Industrial Expansion	25	acres	1,500	gpad	0.038	250	mg/l	78	250	mg/l	78	40	mg/l	13	7	mg/l	2.2
	Subtotal					0.073			185			178			24			4.2
3	Additional Contributors						mg/L			mg/L								
	Septage Hauling					0.0075	7,500	mg/l	469	10,000	mg/l	626	400	mg/l	25	250	mg/l	15.6
	Holding Tank Waste					0.0050	1,500	mg/l	63	1,000	mg/l	42	200	mg/l	8	17	mg/l	0.7
	Subtotal					0.0125			532			667			33			16.3
4	Future Major Industry Request																	
	Unallocated Industrial					0.000	250	mg/l	0	250	mg/l	0	40	mg/l	0	7	mg/l	0.0
	Subtotal					0.000			0			0			0.0			0.0
5	Clear Water Infiltration/Inflow																	
	Existing Dry Weather Infiltration					0.031												
	Existing Sustained I/I					0.320												
	Future Sustained I/I	350	capita	40	gpcd	0.014												
	Proj. Sustained I/I Reduction					0.000												
	Daily Wet Weather I/I					0.501												
	Instantaneous Inflow Factor	(multiplied x daily I/I)		3.00		1.503												
	Maximum Weekly I/I					0.470												
	Annual Average I/I					0.094												
6	Loadings Projections																	
	Average Dry Weather					0.317												
	Average Annual					0.394			1,283			1,276			125			32
	Design (Maximum Sustained)					**0.620**			**1,409**			**1,347**			**125**			**32**
	Maximum Weekly					0.838			878			680			91			16
	Maximum Daily					1.006												
	Peak Hourly					2.213												
7	Current Sustained Loading					0.330			666			502						
8	Existing Facility Rated Capacity					0.620			1,298			1,278		NH3-N	52			
9	Design Without Hauled Waste					0.608			878			680			91			16

Future Loadings Projections - Phase 1 Design Capacity
City of Fennimore WWTP

Peaking Factors Applied to Base Flow (Items 1 and 2)

Maximum Weekly PF	125%
Maximum Daily PF	175%
Peak Hourly PF	250%
2035 Population Projection =	**2,875**

	Data Base Quantity	Data Base Units	Rate	Flow Units	Flow	BOD Rate	BOD Units	BOD Loading	SS Rate	SS Units	SS Loading	TKN Rate	TKN Units	TKN Loading	Phosphorus Rate	Phosphorus Units	Phosphorus Loading
					mgd			lbs/day			lbs/day			lbs/day			lbs/day
1 City Base Loadings																	
Residential	2,525	capita	56	gpcd	0.141												
Commercial	126	customer	237	gpcd	0.030												
Public	52	customer	265	gpcd	0.014												
General Industrial	3	customer	5,300	gpcd	0.016												
Annual Average					0.201			567			431	40	mg/l	67	7	mg/l	11.7
Current Sustained Base Loading					0.201			693			502			67			11.7
2 Future City Increases																	
Population Growth	350	capita	60	gpcd	0.021	0.22	ppcd	77	0.20	ppcd	70	40	mg/l	7	7	mg/l	1.2
Commercial Expansion	12	acres	1,000	gpad	0.012	250	mg/l	25	250	mg/l	25	40	mg/l	4	7	mg/l	0.7
Public Sector Growth	0.75	%	13,300	gpd	0.002	250	mg/l	4	250	mg/l	4	40	mg/l	1	7	mg/l	0.1
General Industrial Expansion	25	acres	1,500	gpad	0.038	250	mg/l	78	250	mg/l	78	40	mg/l	13	7	mg/l	2.2
Subtotal					0.073			185			178			24			4.2
3 Additional Contributors						mg/L			mg/L								
Septage Hauling						7,500	mg/l	0	10,000	mg/l	0	400	mg/l	0	250	mg/l	0.0
Holding Tank Waste						1,500	mg/l	0	1,000	mg/l	0	200	mg/l	0	17	mg/l	0.0
Subtotal					0.0000			0			0			0			0.0
4 Future Major Industry Request																	
Unallocated Industrial					0.000	250	mg/l	0	250	mg/l	0	40	mg/l	0	7	mg/l	0.0
Subtotal					0.000			0			0			0.0			0.0
5 Clear Water Infiltration/Inflow																	
Existing Dry Weather Infiltration					0.031												
Existing Sustained I/I					0.320												
Future Sustained I/I	350	capita	40	gpcd	0.014												
Proj. Sustained I/I Reduction					0.000												
Daily Wet Weather I/I					0.501												
Instantaneous Inflow Factor	(multiplied x daily I/I)		3.00		1.503												
Maximum Weekly I/I					0.470												
Annual Average I/I					0.094												
6 Loadings Projections																	
Average Dry Weather					0.305												
Average Annual					0.382			752			609			91			16
Design (Maximum Sustained)					**0.608**			**878**			**680**			**91**			**16**
Maximum Weekly					0.826			878			680			91			16
Maximum Daily					0.994												
Peak Hourly					2.201												
7 Current Sustained Loading					0.330			666			502						
8 Existing Facility Rated Capacity					0.620			1,298			1,278		NH3-N	52			

Appendix J

Regulatory Agency Correspondence

FE 04/2.0

Amy Bares

From: Novotny, Gerry - DNR <Gerry.Novotny@wisconsin.gov>
Sent: Monday, June 15, 2015 9:14 AM
To: Amy Bares
Cc: Carper, David L - DNR
Subject: RE: Fennimore Facilities Plan

Amy,

I have reviewed the effluent limits request for Fennimore and concluded that the current effluent limits in Fennimore's WPDES permit are appropriate for facilities planning.

As we discussed:

1. the facilities plan will include a discussion of why the 20 year population projection differs from the DOA projection
2. the flow value to use for the compliance maintenance annual report will need to be specified.

Please call if you have any questions.

Gerry Novotny

e are committed to service excellence.
Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

Gerald Novotny
Wastewater Engineer – Bureau of Water Quality
Wisconsin Department of Natural Resources
101 S. Webster, PO Box 7921, Madison, WI 53704
Phone: (608) 267-7625
Fax: (608) 267-7625
Gerry.Novotny@wisconsin.gov

dnr.wi.gov

TOWN & COUNTRY
ENGINEERING, INC.

April 1, 2015

Mr. Thomas Mugan, P.E.
Department of Natural Resources
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921

Dear Mr. Mugan,

The City of Fennimore is undertaking facilities planning for an upgrade to their wastewater treatment facility. The facilities planning document will evaluate the requirements necessary to accommodate future loading conditions, possible equipment and process upgrades, and future phosphorus limits.

At this time I am requesting planning effluent limits for the proposed facility at the current outfall location so that we may proceed with the planning process. The design effluent flow for the proposed upgrade is based on the City's population projections, future industrial requests and an estimation of the infiltration and inflow rates for the collection system. The facility currently discharges to the Gregory Branch in the Upper Grant River Watershed, with the outfall location at coordinates 42°57'48"N and 90°38'59"W. This outfall location is shown on the attached topographic map.

In addition to the map I am also attaching an Effluent Limit Request Worksheet. Please let me know if you need additional information to complete your evaluation.

Sincerely,
TOWN & COUNTRY ENGINEERING, INC.

Ben Heidemann, P.E.
Project Engineer

Enclosures

cc: Mr. Dennis Biddick, P.E., Director of Public Works, City of Fennimore *(P.O. Box 17, Fennimore, WI 53809)*

Mr. Eugene Laschinger, President, Town and Country Engineering, Inc. *(2912 Marketplace Drive, Suite 103, Madison, WI 53719)*

J:\JOB#S\Fennimore\FE 04 08\02 Regulatory\Effl Limit Req Ltr.doc

EFFLUENT LIMIT REQUEST WORKSHEET

Part I - General Information

A. Permittee	City of Fennimore
B. Permit Number	WI 0023981-07-0
C. County	Grant
D. Discharge Location Map	Attached
E. 20-Year Sewer Service Area	
F. Population Projection	
1. Existing Population	2,525
2. Future 20-Year Increase	350
G. Approval from Regional Planning	Not Required

Part II - Flow Projections

A. Residential		
1. Existing Per Capita Flow	GPCD	56
2. Future Increase Per Capita Flow	GPCD	60
3. Total Residential Flow	MGD	0.162
B. Commercial		
1. Existing Commercial Flow	MGD	0.030
2. Future Commercial Increase	MGD	0.012
C. Industrial Flow		
1. Total Non-Metered Industries	MGD	0.016
2. Total Metered Industries	MGD	0.000
3. Future Industrial Increase	MGD	0.038
D. Public Sector		
1. Existing Public Sector Flow	MGD	0.014
2. Future Public Sector Increase	MGD	0.002
E. Outside Contributors		
1. Septage Hauling	MGD	0.008
2. Holding Tank Waste	MGD	0.005
F. Dry Weather Infiltration		
1. Min Sustained Infiltration	MGD	0.031
2. Average Annual I and I	MGD	0.094
G. Wet Weather I and I		
1. Max Monthly	MGD	0.196
2. Sustained	MGD	0.320
3. Future Sustained	MGD	0.014
4. Max Weekly	MGD	0.470
5. Max Daily	MGD	0.501
H. Future Clear Water Reduction	MGD	0.000
I. Peaking Factors		
1. Max Week Peaking Factor (for A through D)		1.25
2. Max Daily Peaking Factor (for A through D)		1.75
3. Max Hourly Peaking Factor (for A through D)		2.50
4. Instaneous Peaking Factor (for I/I Peak Hour)		3.00

EFFLUENT LIMIT REQUEST WORKSHEET

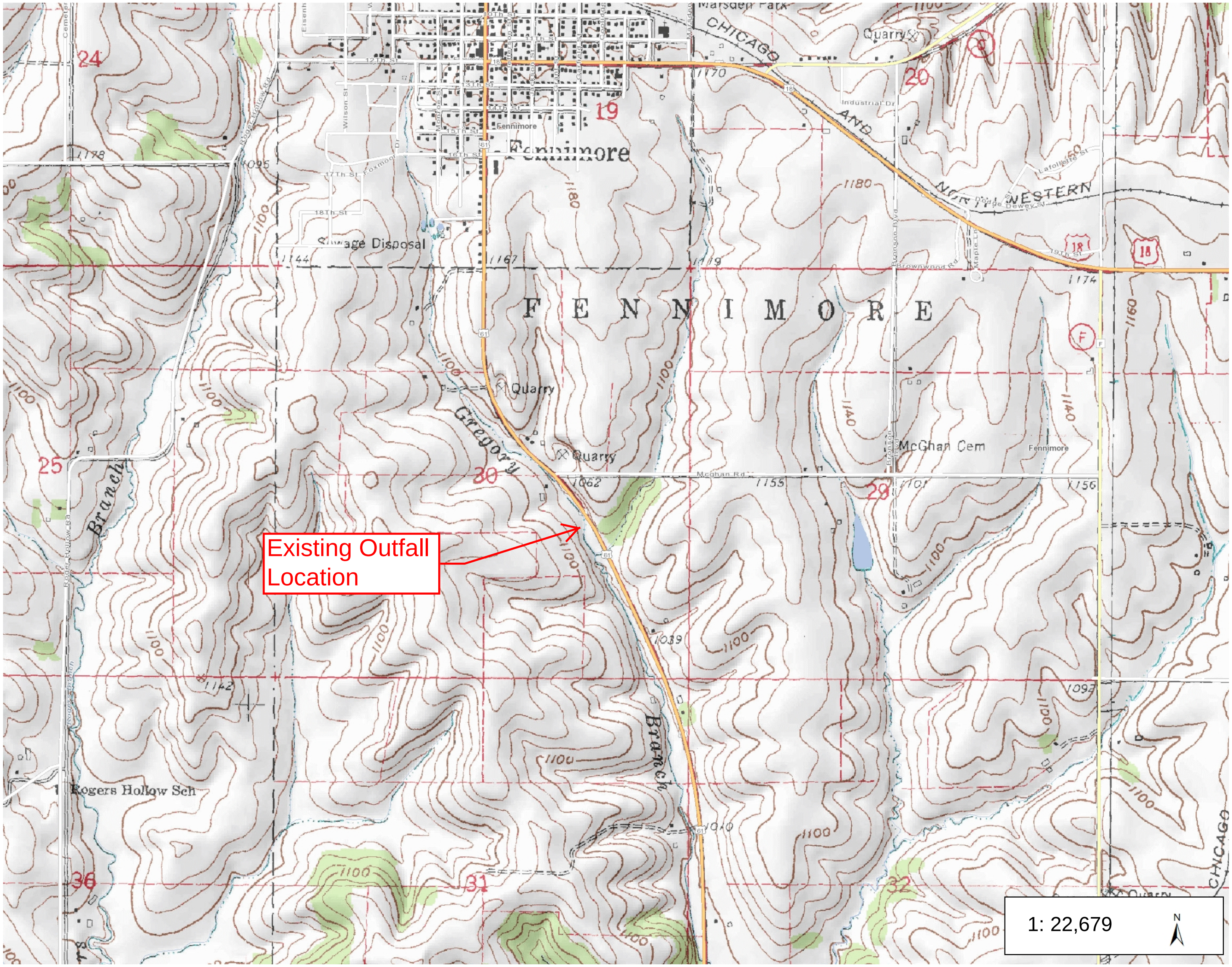
Part III - Flow Summary

A. Dry Weather Flows		
1. Average: A+B+C+D+E+F1	MGD	0.317
2. Max Daily: PF x (A+B+C+D)+E+F1+G3	MGD	0.522
3. Annual Average: A+B+C+D+E+F2+G3-H	MGD	0.394
B. Wet Weather Flows		
1. Max Monthly: A+B+C+D+E+G1-H	MGD	0.482
2. Sustained Design: A+B+C+D+E+G2+G3-H	MGD	**0.620**
3. Max Weekly: PF1 x (A+B+C+D)+E+G3+G4-H	MGD	0.838
4. Max Daily: PF2 x (A+B+C+D)+E+G3+G5-H	MGD	1.006
5. Peak Hourly: PF3 x (A+B+C+D)+E+G3+(PF4 x G5)-H	MGD	2.213

Part IV - Anti-Degradation

A. Current Permitted Design Flow	MGD	0.620
B. Design Flow > Current Permit Flow?		No

City of Fennimore WWTP Outfall Location



Legend

Rivers and Streams

Open Water

Notes

1: 22,679

0.7 0 0.36 0.7 Miles

NAD_1983_HARN_Wisconsin_TM

Appendix K

Existing WWTF Effluent Phosphorus Data

City of Fennimore WWTP
Effluent Phosphorus Data

	2009		2010		2011		2012		2013		2014	
	Effluent Phosphorus *mg/L*	Effluent Phosphorus *lb/day*	Effluent Phosphorus *mg/L*	Effluent Phosphorus *lb/day*	Effluent Phosphorus *mg/L*	Effluent Phosphorus *lb/day*	Effluent Phosphorus *mg/L*	Effluent Phosphorus *lb/day*	Effluent Phosphorus *mg/L*	Effluent Phosphorus *lb/day*	Effluent Phosphorus *mg/L*	Effluent Phosphorus *lb/day*
January	0.622	1.1	0.69	1.7	0.82	1.5	0.87	1.5	0.84	1.4	0.85	1.5
February	0.989	2.1	0.59	1.3	0.84	1.7	0.84	1.4	0.82	1.4	0.73	1.3
March	0.867	2.0	0.62	1.6	0.71	1.9	0.71	1.2	0.79	1.5	0.59	1.3
April	0.912	2.1	0.67	1.8	0.88	2.5	0.72	1.2	0.85	2.0	1.00	2.4
May	1.023	2.0	0.62	1.5	0.67	1.8	0.74	1.3	0.80	1.7	0.64	1.4
June	0.675	1.3	0.61	1.6	0.78	1.6	0.67	1.1	0.68	2.2	0.43	1.0
July	0.544	1.5	0.48	1.5	0.53	1.0	0.59	1.0	0.60	1.6	0.33	0.9
August	0.461	1.2	0.50	2.1	0.77	1.4	0.72	1.2	0.53	1.1	0.38	0.7
September	0.942	2.1	0.69	1.9	0.73	1.3	0.65	1.0	0.68	1.3	0.58	1.1
October	0.648	1.5	0.90	2.0	0.58	1.0	0.67	1.2	0.80	1.4	0.92	1.7
November	0.806	1.9	0.81	1.5	0.83	1.5	0.68	1.2	1.30	2.4		
December	0.738	1.7	0.77	1.3	0.80	1.4	0.59	0.9	0.79	1.3		
Average Monthly Loading	0.769	1.7	0.66	1.7	0.74	1.5	0.70	1.2	0.79	1.6	0.64	1.3
High Month 1	1.023	2.1	0.90	2.1	0.88	2.5	0.87	1.5	1.30	2.4	1.00	2.4
High Month 2	0.989	2.1	0.81	2.0	0.84	1.9	0.84	1.4	0.85	2.2	0.92	1.7
High Month 3	0.942	2.1	0.77	1.9	0.83	1.8	0.74	1.3	0.84	2.0	0.85	1.5
Average of 3 High Values	0.985	2.1	0.83	2.0	0.85	2.1	0.82	1.4	1.00	2.2	0.92	1.9

2009 - 2014 Data Summary - Annual Average

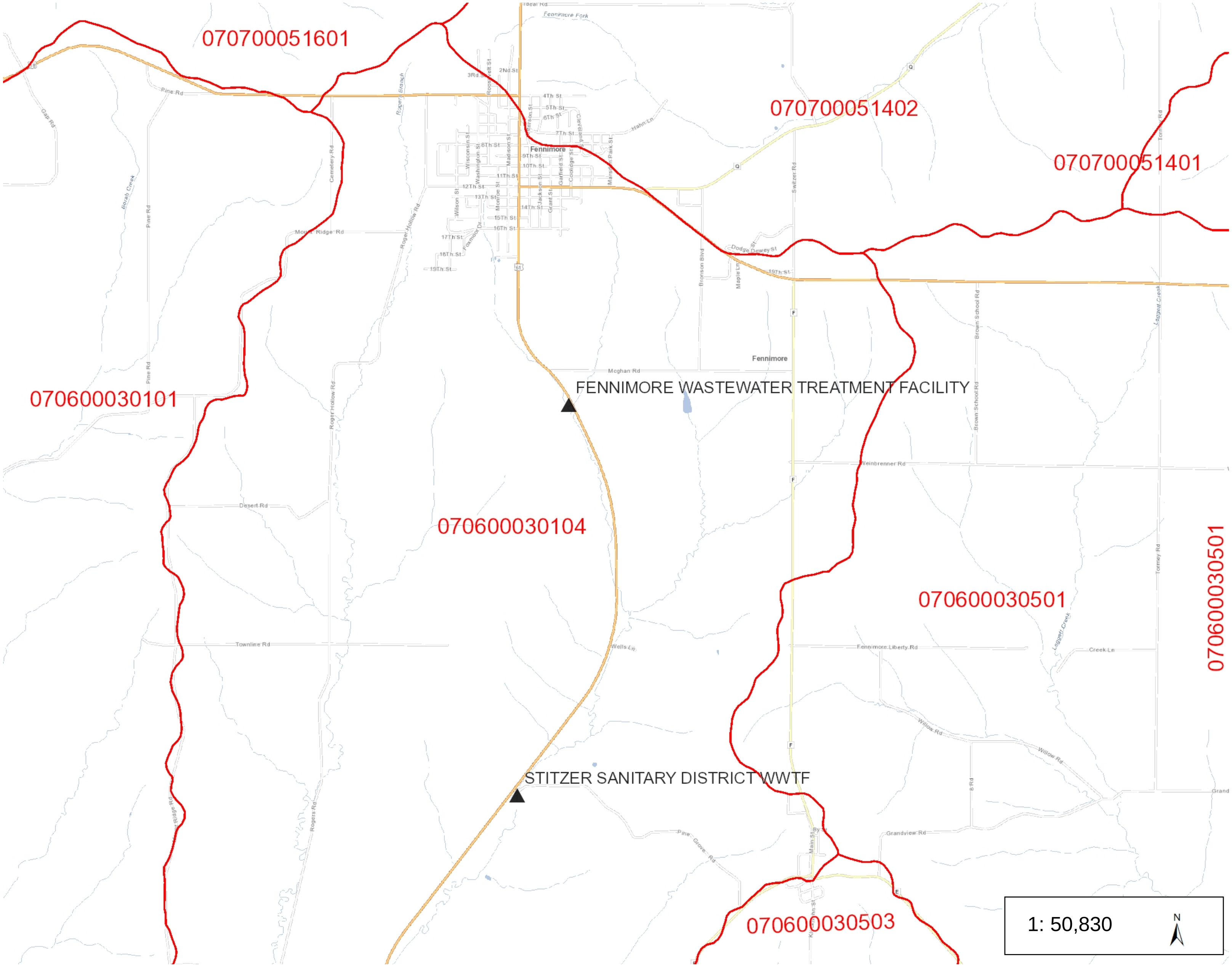
	Effluent Phosphorus *mg/L*	Effluent Phosphorus *lb/day*	
2009	0.77	1.7	
2010	0.66	1.7	
2011	0.74	1.5	
2012	0.70	1.2	
2013	0.79	1.6	
2014	0.65	1.3	(Through Oct 2014)
Average	0.72	1.5	

J:\JOB#S\Fennimore\FE 04 08\10 Design Information\10.2 Process-Civil\FE Phosphorus Alternatives
10/1/2015

Appendix L

Outfall Watershed Information

Fennmore WWTP Outfall Location



Legend

- ▲ Surface Water Outfalls
- 12-digit HUCs (Subwatersheds
- Rivers and Streams
- Open Water

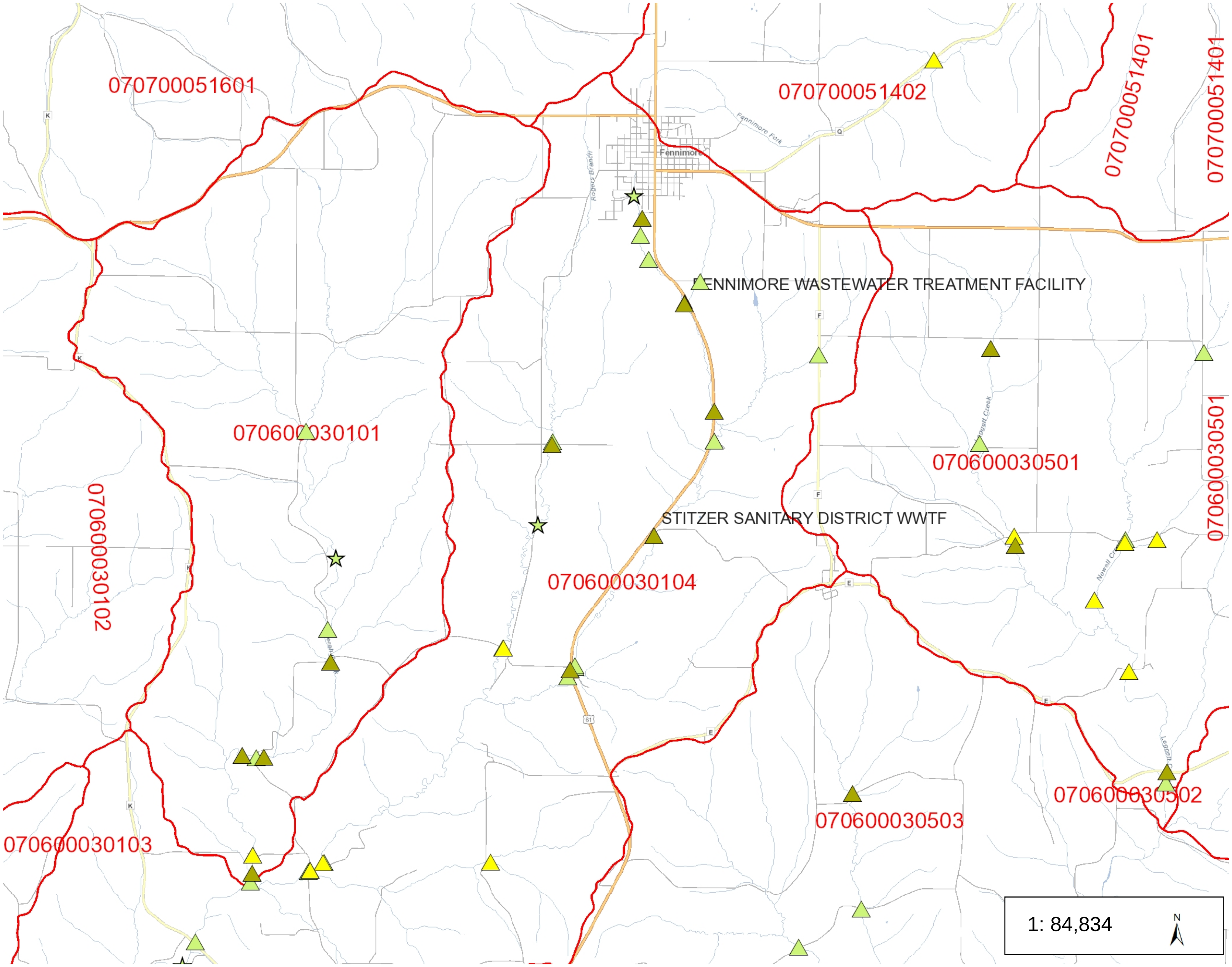
1: 50,830 N

Notes

1.6 0 0.80 1.6 Miles

NAD_1983_HARN_Wisconsin_TM

Fennimore WWTP HUC 12 Watershed



Legend

- SWIMS Station Point with Hist
- Station Points with Recent Dat
- SWIMS Monitoring Station Poi
  - New Station, Pending.
  - Active, Usable.
- Surface Water Outfalls
- 12-digit HUCs (Subwatersheds
- Rivers and Streams
- Open Water

Notes

1: 84,834

2.7 0 1.34 2.7 Miles

NAD_1983_HARN_Wisconsin_TM

Sample Point ID	Permit No.	Facility Name	Receiving Water	Major Basin	Watershed Area	Nonpoint Load *	2009-2011 Avg. Upstream Point Source Load	2009-2011 Avg. Point Source Load	Total Load *	Point : Nonpoint Source Ratio *	Nonpoint Source Dominated?	Model Flag
					(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(%)		**
47833	20851	SILVER LAKE VILLAGE	Fox River	Fox (IL)	832.4	149157	48229	425	197811	25:75	Yes	
47713	20559	SUSSEX WASTEWATER TREATMENT FACILITY	Unnamed	Fox (IL)	7.9	283	0	2855	3138	91:9	Speak with WDNR Basin Engineer	
48154	21695	TWIN LAKES WASTEWATER TREATMENT FAC	Unnamed	Fox (IL)	1.0	14	0	866	880	98:2	Speak with WDNR Basin Engineer	
49961	30856	V I P SERVICES INC	Unnamed	Fox (IL)	0.3	126	0	11	137	8:92	Yes	
49763	29971	WAUKESHA CITY	Fox River	Fox (IL)	127.1	23077	22689	7998	53764	57:43	Speak with WDNR Basin Engineer	
49528	28754	WESTERN RACINE COUNTY SEWERAGE DISTRICT	Fox River	Fox (IL)	447.3	70705	34132	2328	107165	34:66	Yes	
49988	31011	WHEATLAND ESTATES MHP	Fox River	Fox (IL)	791.5	137983	47232	105	185320	26:74	Yes	
50154	31887	WI DNR RICHARD BONG RECREATION AREA	Peterson Creek	Fox (IL)	2.3	153	0	26	179	15:85	Yes	
57807	49131	WISCONSIN ELECTRIC POWER CO -TN OF PARIS	Unnamed	Fox (IL)	0.0	4	0	0	4	0:100	Yes	EC
52073	60771	BAGLEY WASTEWATER TREATMENT FACILITY	Glass Hollow Creek	Grant - Platte	7.7	6629	0	719	7348	10:90	Yes	
47760	20672	BENTON WASTEWATER TREATMENT FACILITY	Galena River	Grant - Platte	71.6	116710	0	831	117541	1:99	Yes	
48631	23400	BLOOMINGTON WASTEWATER TREATMENT FACILITY	Blake Fork	Grant - Platte	18.0	34563	338	396	35297	2:98	Yes	
48070	21423	CASSVILLE WASTEWATER TREATMENT FACILITY	Mississippi River	Grant - Platte				1367			No Result	
48320	22217	CUBA CITY WASTEWATER TREATMENT FACILITY	Coon Branch	Grant - Platte	0.6	85	0	2434	2519	97:3	Speak with WDNR Basin Engineer	
48712	23817	DICKEYVILLE WASTEWATER TREATMENT FACILITY	Unnamed	Grant - Platte	0.2	90	0	1097	1187	92:8	Speak with WDNR Basin Engineer	
48755	23981	FENNIMORE WASTEWATER TREATMENT FACILITY	Gregory Branch	Grant - Platte	0.6	328	0	598	926	65:35	Speak with WDNR Basin Engineer	
48784	24210	HAZEL GREEN WASTEWATER TREATMENT FACILITY	Galena River	Grant - Platte				1156			No Result	
49893	30627	JAMESTOWN SANITARY DISTRICT NO 2 WWTF	Menominee River	Grant - Platte	12.5	19383	12	64	19459	0:100	Yes	
50125	31755	JAMESTOWN SANITARY DISTRICT NO 3 WWTF	Louisburg Creek	Grant - Platte	2.3	3481	0	12	3493	0:100	Yes	
49637	29289	KIELER SANITARY DISTRICT NO 1 WWTF	Sinnipee Creek	Grant - Platte	0.1	17	0	474	491	97:3	Speak with WDNR Basin Engineer	
48819	24503	LANCASTER WASTEWATER TREATMENT FACILITY	Unnamed	Grant - Platte	0.4	53	0	1453	1506	96:4	Speak with WDNR Basin Engineer	
48314	22187	LIVINGSTON WASTEWATER TREATMENT FACILITY	Little Platte River	Grant - Platte	0.5	91	0	959	1050	91:9	Speak with WDNR Basin Engineer	
47860	20907	MOUNT HOPE WASTEWATER TREATMENT FACILITY	Little Grant River	Grant - Platte	0.7	625	0	113	738	15:85	Yes	
49876	30503	ORCHARD MANOR WASTEWATER TREATMENT FACILITY	Austin Branch	Grant - Platte	0.4	202	0	275	477	58:42	Speak with WDNR Basin Engineer	
48442	22705	PATCH GROVE WASTEWATER TREATMENT FACILITY	Unnamed	Grant - Platte	1.3	717	0	338	1055	32:68	Yes	
47656	20435	PLATTEVILLE WASTEWATER TREATMENT FACILITY	Rountree Branch	Grant - Platte	12.4	20243	0	1625	21868	7:93	Yes	
48109	21547	POTOSI-TENNYSON SEWAGE COMMISSION WWTF	Unnamed	Grant - Platte	3.2	735	0	1430	2165	66:34	Speak with WDNR Basin Engineer	
49452	28321	SHULLSBURG WASTEWATER TREATMENT FACILITY	Shullsburg Branch	Grant - Platte	7.8	8679	0	1804	10483	17:83	Yes	
49880	30520	SINSINAWA DOMINICANS INC WWTF	Unnamed	Grant - Platte	0.1	20	0	333	353	94:6	Speak with WDNR Basin Engineer	
50385	36285	STITZER SANITARY DISTRICT WWTF	Gregory Branch	Grant - Platte	6.5	3974	598	145	4717	16:84	Yes	
47006	2381	WISCONSIN POWER & LIGHT NELSON DEWEY GEN STATIO	Mississippi River	Grant - Platte				225			No Result	
55549	49859	ABRAMS SANITARY DISTRICT 1	Pensaukee River	Green Bay	113.5	74627	730	507	75864	2:98	Yes	
50143	31852	AURORA SANITARY DISTRICT # 1	Menominee River	Green Bay				294			No Result	
48283	22080	COLEMAN WASTEWATER TREATMENT FACILITY	Little Peshtigo River	Green Bay	45.7	8227	0	922	9149	10:90	Yes	
51972	60372	CRIVITZ WASTEWATER TREATMENT FACILITY	Peshtigo River	Green Bay	659.4	80515	1477	1435	83427	3:97	Yes	
48273	22063	GILLETT WASTEWATER TREATMENT FACILITY	Oconto River	Green Bay	682.1	75914	2032	1768	79714	5:95	Yes	
46872	1732	GRAF CREAMERY INC	Pensaukee River	Green Bay	6.5	4600	0	24	4624	1:99	Yes	
46387	540	KIMBERLY CLARK CORPORATION MARINETTE	Menominee River	Green Bay				138			No Result	
49417	28169	KRAKOW SANITARY DISTRICT WWTF	Pensaukee River	Green Bay	46.3	48055	24	706	48785	1:99	Yes	
55351	49841	LAKEWOOD SANITARY DISTRICT NO 1	McCaslin Brook	Green Bay	58.0	3417	0	503	3920	13:87	Yes	
49515	28592	LAONA SANITARY DISTRICT #1	Rat River	Green Bay	38.1	2320	0	273	2593	11:89	Yes	
52188	61361	LENA WASTEWATER TREATMENT FACILITY	Jones Creek	Green Bay	0.9	98	0	336	434	77:23	Speak with WDNR Basin Engineer	
72506	31968	LITTLE SUAMICO SANITARY DISTRICT NO 1	Little Suamico River	Green Bay	60.1	50075	0	255	50330	1:99	Yes	
49131	26182	MARINETTE WASTEWATER UTILITY	Menominee River	Green Bay				3915			No Result	
46487	752	NEWPAGE CORPORATION NIAGARA MILL	Menominee River	Green Bay				61			No Result	
49677	29467	NIAGARA WASTEWATER TREATMENT FACILITY	Menominee River	Green Bay				482			No Result	
48532	22870	OCONTO FALLS WASTEWATER TREATMENT FACILITY	Oconto River	Green Bay	713.7	80525	5442	417	86384	7:93	Yes	
48526	22861	OCONTO UTILITY COMMISSION WWTF	Oconto River	Green Bay	956.3	155967	6295	589	162851	4:96	Yes	
49904	30651	PESHTIGO JOINT WASTEWATER TREATMENT FACILITY	Peshtigo River	Green Bay	1113.4	147818	3834	1352	153004	3:97	Yes	
50856	44628	PROVIMI FOODS INC	Unnamed	Green Bay	0.1	78	0	33	111	30:70	Yes	
49299	27308	SAPUTO CHEESE USA LENA	Jones Creek	Green Bay	0.9	101	336	100	537	81:19	Speak with WDNR Basin Engineer	
44781	345	SENECA FOODS CORPORATION GILLETT	Christie Brook	Green Bay	8.0	810	0	108	918	12:88	Yes	
46369	531	ST PAPER LLC	Oconto River	Green Bay	713.5	80497	3908	1534	85939	6:94	Yes	
47839	20877	SURING WASTEWATER TREATMENT FACILITY	Oconto River	Green Bay	602.4	60605	1497	535	62637	3:97	Yes	
50802	43699	THYSSENKRUPP WAUPACA INC MARINETTE	Menominee River	Green Bay				210			No Result	
46699	1040	TYCO FIRE SUPPRESSION & BP - ANSUL LLC	Menominee River	Green Bay				185			No Result	
48254	22012	WABENO SANITARY DISTRICT #1	North Branch Oconto River	Green Bay	31.2	2458	0	640	3098	21:79	Yes	
51879	60011	WAUSAUKEE WASTEWATER TREATMENT FACILITY	Menominee River	Green Bay				678			No Result	
48456	22721	WI DNR LAKEWOOD REARING STATION	Unnamed	Green Bay	4.2	382	0	129	511	25:75	Yes	
48459	22748	WI DNR LANGLADE REARING STATION	Dalton Creek	Green Bay	11.0	430	0	225	655	34:66	Yes	0
48445	22713	WI DNR THUNDER RIVER REARING STATION	South Fork Thunder River	Green Bay	21.1	3145	0	1204	4349	28:72	Yes	
49208	26808	AMNICON FOUNDATION	Wetland	Lake Superior	0.0	0	0	2	2	97:3	Speak with WDNR Basin Engineer	EC
49938	30767	ASHLAND SEWAGE UTILITY	Lake Superior	Lake Superior				1862			No Result	
52186	61336	BELL SANITARY DISTRICT 1	Lake Superior	Lake Superior				116			No Result	
52248	70726	BURLINGTON NORTHERN SANTA FE RAILWAY COMPANY	Unnamed	Lake Superior	240.9	132821	1	10	132832	0:100	Yes	
50179	32069	CLOVER SANITARY DISTRICT	Unnamed	Lake Superior	0.1	11	0	90	101	89:11	Speak with WDNR Basin Engineer	EC
50100	31615	DRUMMOND SANITARY DISTRICT 1	Unnamed	Lake Superior				117			No Result	
50880	44831	DULUTH WINNIPEG & PACIFIC RAILWAY	Unnamed	Lake Superior	0.9	76	0	5	81	6:94	Yes	
50302	35131	GRAND VIEW SANITARY DISTRICT	Twentymile Creek	Lake Superior	17.1	6088	0	57	6145	1:99	Yes	
50846	44334	IRON RIVER NATIONAL FISH HATCHERY	Schacte Creek	Lake Superior	2.5	224	0	953	1177	81:19	Speak with WDNR Basin Engineer	
71336	28941	KNIGHT TOWN OF	Alder Creek	Lake Superior	10.1	5155	0	11	5166	0:100	Yes	
49936	30759	MADELINE SANITARY DISTRICT	Lake Superior	Lake Superior				157			No Result	
49574	29009	MAPLE SCHOOL DISTRICT	Bardon Creek	Lake Superior	0.2	282	0	20	302	7:93	Yes	
47609	20311	MELLEN CITY OF	Bad River	Lake Superior	99.0	20152	0	587	20739	3:97	Yes	
49736	29742	MIDDLE RIVER HEALTH & REHABILITATION CENTER	Middle River	Lake Superior	33.4	4099	0	107	4206	3:97	Yes	
50539	38946	MIDWEST ENERGY RESOURCES COMPANY	Lake Superior	Lake Superior				32			No Result	
48349	22306	MONTREAL CITY OF	West Fork Montreal River	Lake Superior	75.8	12776	0	978	13754	7:93	Yes	

City of Fennimore WWTP
Watershed Data

From L-THIA (Long-Term Hydrologic Impact Assessment) Output
https://engineering.purdue.edu/mapserve/www/lthia_wi/

Watershed Delineated for Current Outfall

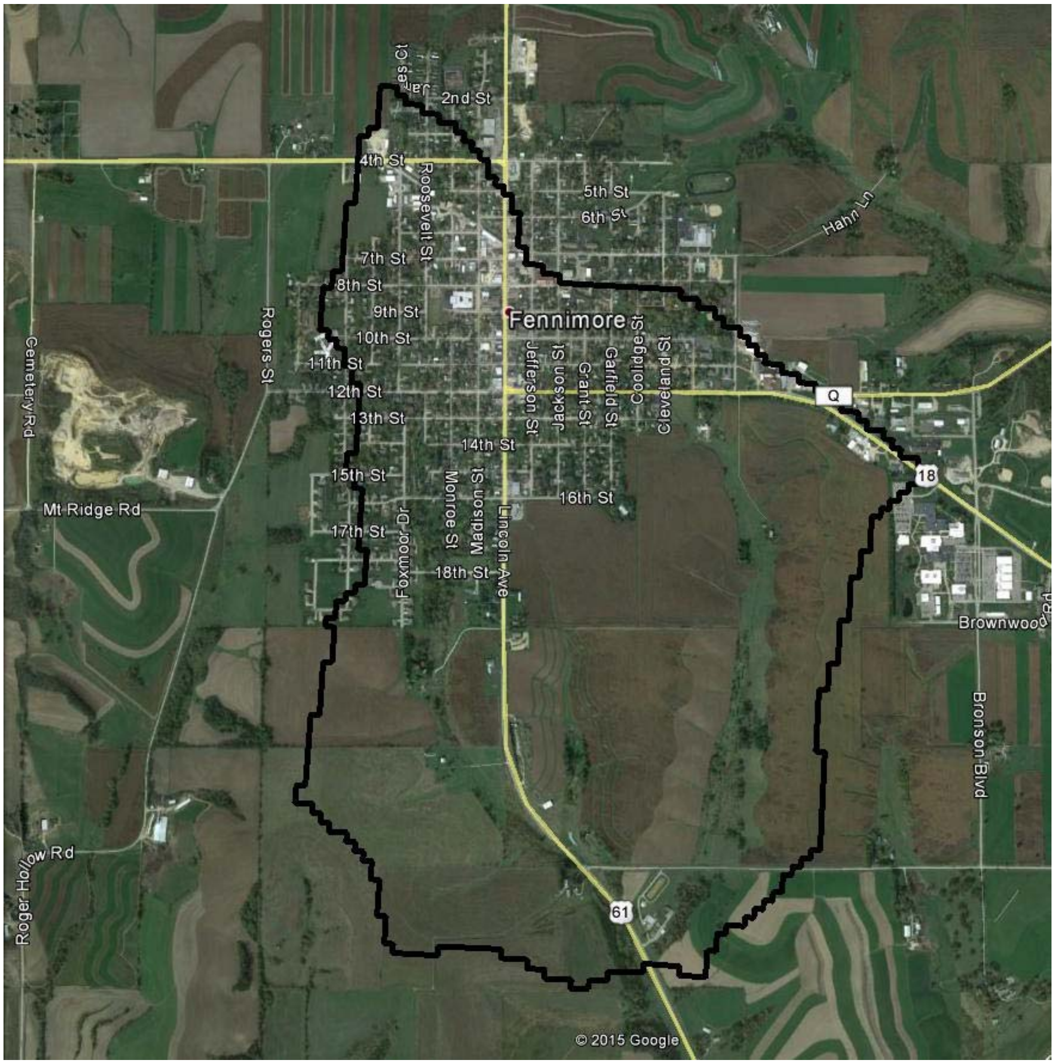
Apparent outlet point coordinate (In GCS_WGS_1984):

Lat = 42.96342621851386
Lng = -90.65003871917725

Watershed contained within the HUC8 07060003.

Land use	Soil group	Area(acres)
Open Space/Park	B	43.37
Low-Density Residential (general 1/3 - 2 ac lots)	B	260.87
Low-Density Residential (general 1/3 - 2 ac lots)	C	1.33
High-density Residential (townhomes to 1/4 ac lots)	B	66.27
Commercial/Industrial/Transportation	B	4.67
Deciduous Forest	B	8.90
Deciduous Forest	C	0.22
Pasture/Hay	B	189.70
Pasture/Hay	C	2.45
Cropland generalized agriculture	B	397.86
Cropland generalized agriculture	C	15.35
Total		990.99

Watershed Area Defined for Fennimore WWTP Discharge Point



Appendix M

Cost Evaluations

- Capital Costs
- O&M Costs
- Replacement Costs
- Present Worth Analysis
- Supporting O&M Information

City of Fennimore
WWTP Facilities Planning
Base Capital Cost for Alternatives

			Alt 1	Alt 2	Alt 3
1	Site Work		$156,580	$156,580	$156,580
2	New Headworks w/ Grit		$1,160,300	$1,160,300	$1,160,300
3	Influent Pumping		$240,580	$240,580	$240,580
4	Equalization Tank		$48,250	$48,250	$48,250
5	Primary Clarifiers				
	Demolition		$0	$0	$31,000
	Upgrades to Existing		$25,780	$25,780	$0
6	Splitter/Selectors		$0	$411,510	$411,510
7	Secondary Treatment				
	Demolition of RBC Units		$24,500	$53,000	$53,000
	Upgrades to Existing RBCs		$1,110,100	$0	$0
	New RBC		$836,025	$0	$0
	New Aeration Basins		$0	$747,020	$844,400
8	Process Building (Blowers/RAS/WAS)		$0	$828,890	$828,890
9	Chemical Feed		$56,725	$56,725	$67,900
10	Final Clarifiers				
	Additional Third Clarifier		$0	$411,480	$411,480
11	Tertiary Filtration				
	Demolition of Existing Filter/Room Rehab		$60,920	$60,920	$60,920
	Construction of New Filter		$656,900	$0	$0
12	Solids Handling/Thickening				
13	Digester Complex				
	Rehab of Existing Anaerobic Digester		$855,999	$855,999	$0
	Conversion to Aerobic Digestion		$0	$0	$370,065
14	Sludge Storage		$0	$0	$0
15	Waste Receiving Station		$293,115	$293,115	$293,115
16	Lab/Contros Building		$170,638	$170,638	$170,638
17	Garage				
	Upgrade Existing Garage		$76,944	$76,944	$76,944
	Subtotal		$5,773,356	$5,597,731	$5,225,572
	Electrical	20%	$1,154,671	$1,119,546	$1,045,114
	Construction Cost w/Electrical		$6,928,027	$6,717,277	$6,270,686
	Additional Contractor Costs	8%	$554,242	$537,382	$501,655
	Total Construction Cost		$7,482,269	$7,254,659	$6,772,341
	Design & Management Costs				
	Contingencies	10%	$748,227	$725,466	$677,234
	Engineering, Admin, Legal	15%	$1,122,340	$1,088,199	$1,015,851
	Total Project Cost		**$9,352,836**	**$9,068,323**	**$8,465,427**

Notes:

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

City of Fennimore
WWTP Facilities Planning
Capital Cost Adders

		Alt 1	Alt 2	Alt 3
2	Headworks			
	Eliminate Screen at Existing Location	($143,100)	($143,100)	($143,100)
	New Headworks Building Construction	$1,160,300	$1,160,300	$1,160,300
	Electrical	$203,440	$203,440	$203,440
	Additional Contractor Costs	$97,651	$97,651	$97,651
	Contingencies, Engr and Admin	$329,573	$329,573	$329,573
	Subtotal	$1,647,864	$1,647,864	$1,647,864
7	Secondary Treatment			
	New RBC Train	$836,025	$0	$0
	Electrical	$167,205	$0	$0
	Additional Contractor Costs	$13,376	$0	$0
	Contingencies, Engr and Admin	$254,152	$0	$0
	Subtotal	$1,270,758	$0	$0
12	Solids Handling/Thickening			
	Install New DAF Unit with Building	$0	$716,190	$716,190
	Electrical	$0	$143,238	$143,238
	Additional Contractor Costs	$0	$68,754	$68,754
	Contingencies, Engr and Admin	$0	$232,046	$232,046
	Subtotal	$0	$1,160,228	$1,160,228
13	Digester Complex			
	Eliminate Digester Cover Rehab	($86,250)	($86,250)	$0
	New Digester Cover	$155,250	$155,250	$0
	Electrical	$13,800	$13,800	$0
	Additional Contractor Costs	$6,624	$6,624	$0
	Contingencies, Engr and Admin	$22,356	$22,356	$0
	Subtotal	$111,780	$111,780	$0
17	Garage			
	Eliminate Existing Garage Upgrade	($76,944)	($76,944)	($76,944)
	Existing Structure Demolition	$10,000	$10,000	$10,000
	New Construction	$297,640	$297,640	$297,640
	Electrical	$46,139	$46,139	$46,139
	Additional Contractor Costs	$22,147	$22,147	$22,147
	Contingencies, Engr and Admin	$74,746	$74,746	$74,746
	Subtotal	$373,728	$373,728	$373,728

City of Fennimore
WWTP Facilities Planning
Capital Costs for WWTP Upgrade Alternatives

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
1 Site Work											
Erosion Control	1	1	1	LS	$1,000	$1,000	$1,000	1.00	$1,000	$1,000	$1,000
Site Grading	1	1	1	LS	$7,500	$7,500	$7,500	1.00	$7,500	$7,500	$7,500
Site Fencing	500	500	500	LF	$20	$20	$20	1.00	$10,000	$10,000	$10,000
Front Gate Security	1	1	1		$20,000	$20,000	$20,000	1.00	$20,000	$20,000	$20,000
Dewatering and Sheeting	1	1	1	LS	$10,000	$10,000	$10,000	1.00	$10,000	$10,000	$10,000
Site Conditions/Constraints	1	1	1	LS	$10,000	$10,000	$10,000	1.00	$10,000	$10,000	$10,000
Asphalt Paving	702	702	702	SY	$40	$40	$40	1.00	$28,080	$28,080	$28,080
Sidewalks	400	400	400	SF	$7.50	$8	$8	1.00	$3,000	$3,000	$3,000
Site Piping Valves	20	20	20	EA	$1,500	$1,500	$1,500	1.00	$30,000	$30,000	$30,000
Painting				LS	$15,000	$15,000	$15,000	1.00	$0	$0	$0
Landscaping	2,500	2,500	2,500	SF	$10	$10	$10	1.00	$25,000	$25,000	$25,000
Seed, Fertilizer, Mulch	1,200	1,200	1,200	SY	$10	$10	$10	1.00	$12,000	$12,000	$12,000
									$156,580	**$156,580**	**$156,580**
2 Headworks											
2A New Screening Building											
Construction											
Excavation	98	98	98	CY	$30	$30	$30	1.00	$2,940	$2,940	$2,940
Rock Excavation	415	415	415	CY	$100	$100	$100	1.00	$41,500	$41,500	$41,500
Structural fill	85	85	85	CY	$25	$25	$25	1.00	$2,125	$2,125	$2,125
Circular walls	0	0	0	CY	$675	$675	$675	1.00	$0	$0	$0
Straight walls	144	144	144	CY	$600	$600	$600	1.00	$86,400	$86,400	$86,400
Slab on soil	78	78	78	CY	$550	$550	$550	1.00	$42,900	$42,900	$42,900
Shored slab	0	0	0	CY	$1,100	$1,100	$1,100	1.00	$0	$0	$0
Shored beams	0	0	0	CY	$1,700	$1,700	$1,700	1.00	$0	$0	$0
Columns	0	0	0	CY	$1,150	$1,150	$1,150	1.00	$0	$0	$0
Concrete fill	55	55	55	CY	$400	$400	$400	1.00	$22,000	$22,000	$22,000
Misc concrete	4	4	4	CY	$750	$750	$750	1.00	$3,000	$3,000	$3,000
Block walls - split face	2,888	2,888	2,888	SF	$30	$30	$30	1.00	$86,640	$86,640	$86,640
Block wall - plain	875	875	875	SF	$20	$20	$20	1.00	$17,500	$17,500	$17,500
Concrete plank	1,932	1,932	1,932	SF	$15	$15	$15	1.00	$28,980	$28,980	$28,980
Roofing	1,932	1,932	1,932	SF	$20	$20	$20	1.00	$38,640	$38,640	$38,640
Architectural	1,932	1,932	1,932	SF	$20	$20	$20	1.00	$38,640	$38,640	$38,640
Doors and windows	1	1	1	LS	$20,000	$20,000	$20,000	1.00	$20,000	$20,000	$20,000
Stairs and railings	54	54	54	LF	$75	$75	$75	1.00	$4,050	$4,050	$4,050
Miscellaneous metals	1	1	1	LS	$25,000	$25,000	$25,000	1.00	$25,000	$25,000	$25,000
Equipment Installation											
Mechanical screen and compactor	1	1	1	EA	$90,000	$90,000	$90,000	1.25	$112,500	$112,500	$112,500
Sampling equipment	1	1	1	EA	$3,000	$3,000	$3,000	1.25	$3,750	$3,750	$3,750
Odor Control System	1	1	1	EA	$25,000	$25,000	$25,000	1.00	$25,000	$25,000	$25,000
Piping and Valves - Interior											
10" Influent	40	40	40	LF	$225	$225	$225	1.00	$9,000	$9,000	$9,000
6" Bypass	50	50	50	LF	$75	$75	$75	1.00	$3,750	$3,750	$3,750
Non-actuated valves	1	1	1	LS	$7,500	$7,500	$7,500	1.00	$7,500	$7,500	$7,500
Actuated valves	5	5	5	EA	$1,500	$1,500	$1,500	1.00	$7,500	$7,500	$7,500
Process gates	8	8	8	EA	$3,500	$3,500	$3,500	1.00	$28,000	$28,000	$28,000
Piping and Valves - Yard											
10" Influent	260	260	260	LF	$225	$225	$225	1.00	$58,500	$58,500	$58,500
6" To Overflow	110	110	110	LF	$125	$125	$125	1.00	$13,750	$13,750	$13,750
Painting											
Structure surfaces	6,500	6,500	6,500	SF	$5	$5	$5	1.00	$32,500	$32,500	$32,500

City of Fennimore
WWTP Facilities Planning
Capital Costs for WWTP Upgrade Alternatives

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Pipes	1,100	1,100	1,100	SF	$10	$10	$10	1.00	$11,000	$11,000	$11,000
Equipment	10	10	10	EA	$750	$750	$750	1.00	$7,500	$7,500	$7,500
HVAC	1,932	1,932	1,932	SF	$50	$50	$50	1.00	$96,600	$96,600	$96,600
Plumbing	1,932	1,932	1,932	SF	$15	$15	$15	1.00	$28,980	$28,980	$28,980
									$906,145	**$906,145**	**$906,145**
2B Upgrade Existing Screening											
Demolition											
Screen removal	1	1	1	EA	$2,500	$2,500	$2,500	1.00	$2,500	$2,500	$2,500
Channels	1	1	1	LS	$5,000	$5,000	$5,000	1.00	$5,000	$5,000	$5,000
Floor penetration	1	1	1	LS	$1,500	$1,500	$1,500	1.00	$1,500	$1,500	$1,500
Structure modifications	1	1	1	LS	$7,500	$7,500	$7,500	1.00	$7,500	$7,500	$7,500
Equipment installation											
Mechanical screen and compactor	1	1	1	EA	$90,000	$90,000	$90,000	1.40	$126,000	$126,000	$126,000
Sampling equipment	1	1	1	EA	$3,000	$3,000	$3,000	1.25	$3,750	$3,750	$3,750
Plumbing	300	300	300	SF	$12	$12	$12	1.00	$3,600	$3,600	$3,600
Painting											
Structure surfaces	950	950	950	SF	$8	$8	$8	1.00	$7,600	$7,600	$7,600
Pipes	100	100	100	SF	$10	$10	$10	1.00	$1,000	$1,000	$1,000
Equipment	3	3	3	EA	$750	$750	$750	1.00	$2,250	$2,250	$2,250
Repairs to EQ Tank Splitter Structure	1	1	1	LS	$5,000	$5,000	$5,000	1.00	$5,000	$5,000	$5,000
									$165,700	**$165,700**	**$165,700**
2C New Grit Removal Addition											
Construction											
Excavation	20	20	20	CY	$100	$100	$100	1.00	$2,000	$2,000	$2,000
Rock Excavation	150	150	150	CY	$100	$100	$100	1.00	$15,000	$15,000	$15,000
Structural fill	25	25	25	CY	$25	$25	$25	1.00	$625	$625	$625
Circular walls	10	10	10	CY	$750	$750	$750	1.00	$7,500	$7,500	$7,500
Straight walls	25	25	25	CY	$650	$650	$650	1.00	$16,250	$16,250	$16,250
Slab on soil	15	15	15	CY	$550	$550	$550	1.00	$8,250	$8,250	$8,250
Concrete fill	5	5	5	CY	$400	$400	$400	1.00	$2,000	$2,000	$2,000
Stairs and railings	50	50	50	LF	$75	$75	$75	1.00	$3,750	$3,750	$3,750
Miscellaneous metals	1	1	1	LS	$7,500	$7,500	$7,500	1.00	$7,500	$7,500	$7,500
Equipment Installation											
Grit removal equipment	1	1	1	EA	$35,000	$35,000	$35,000	1.25	$43,750	$43,750	$43,750
Grit pump	1	1	1	LS	$30,000	$30,000	$30,000	1.25	$37,500	$37,500	$37,500
Grit washer	1	1	1	EA	$75,000	$75,000	$75,000	1.25	$93,750	$93,750	$93,750
Piping and Valves - Interior											
6" Grit	100	100	100	LF	$75	$75	$75	1.00	$7,500	$7,500	$7,500
Valves	3	3	3	EA	$1,050	$1,050	$1,050	1.20	$3,780	$3,780	$3,780
Plumbing	1	1	1	LS	$5,000	$5,000	$5,000	1.00	$5,000	$5,000	$5,000
									$254,155	**$254,155**	**$254,155**
3 Influent Pumping											
Demolition											
Pump removal	4	4	4	EA	$1,500	$1,500	$1,500	1.00	$6,000	$6,000	$6,000
HVAC removal incl screening area	612	612	612	SF	$10	$10	$10	1.00	$6,120	$6,120	$6,120
Plumbing removal	1	1	1	LS	$1,500	$1,500	$1,500	1.00	$1,500	$1,500	$1,500
Equipment Install											
High Capacity Pumps	0	0	0	EA	$27,500	$27,500	$27,500	1.25	$0	$0	$0
Low Capacity Pumps	4	4	4	EA	$22,500	$22,500	$22,500	1.25	$112,500	$112,500	$112,500

City of Fennimore
WWTP Facilities Planning
Capital Costs for WWTP Upgrade Alternatives

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Piping and Valves - Interior											
Main Discharge Piping	75	75	75	LF	$200	$200	$200	1.00	$15,000	$15,000	$15,000
Bypass	30	30	30	LF	$200	$200	$200	1.00	$6,000	$6,000	$6,000
Actuated valves	2	2	2	EA	$7,500	$7,500	$7,500	1.00	$15,000	$15,000	$15,000
Process valves	8	8	8	EA	$1,500	$1,500	$1,500	1.00	$12,000	$12,000	$12,000
HVAC	612	612	612	SF	$75	$75	$75	1.00	$45,900	$45,900	$45,900
Painting											
Building surfaces	1,595	1,595	1,595	SF	$8	$8	$8	1.00	$12,760	$12,760	$12,760
Equipment	4	4	4	EA	$1,250	$1,250	$1,250	1.00	$5,000	$5,000	$5,000
Pipe surfaces	280	280	280	SF	$10	$10	$10	1.00	$2,800	$2,800	$2,800
									$240,580	**$240,580**	**$240,580**
4 Equalization Tank											
Equipment											
Submersible pumps	2	2	2	EA	$12,500	$12,500	$12,500	1.25	$31,250	$31,250	$31,250
Piping and Valves											
Valves	6	6	6	EA	$1,250	$1,250	$1,250	1.00	$7,500	$7,500	$7,500
Blower piping	75	75	75	LF	$100	$100	$100	1.00	$7,500	$7,500	$7,500
Painting											
Equipment	2	2	2	EA	$1,000	$1,000	$1,000	1.00	$2,000	$2,000	$2,000
									$48,250	**$48,250**	**$48,250**
5 Primary Clarifiers											
5A Demolition											
Mechanism Removal			2	EA	$9,500	$9,500	$9,500	1.00	$0	$0	$19,000
Concrete			120	CY	$100	$100	$100	1.00	$0	$0	$12,000
									$0	**$0**	**$31,000**
5B Upgrades to Existing											
Equipment											
Skimmers	2	2		EA	$2,250	$2,250	$2,250	1.20	$5,400	$5,400	$0
Baffles	1	1		LS	$1,200	$1,200	$1,200	1.20	$1,440	$1,440	$0
Weirs	1	1		LS	$1,200	$1,200	$1,200	1.20	$1,440	$1,440	$0
Piping and Valves											
Piping Modifications				LS		$0	$0	1.00	$0	$0	$0
Non-actuated valves				EA	$1,250	$1,250	$1,250	1.00	$0	$0	$0
Actuated valves - add actuators	4	4		EA	$1,500	$1,500	$1,500	1.00	$6,000	$6,000	$0
Flume Building											
Flow Control Valve	1	1		EA	$5,000	$5,000	$5,000	1.00	$5,000	$5,000	$0
HVAC Modifications	120	120		SF	$50	$50	$50	1.00	$6,000	$6,000	$0
Painting											
Structure				SF	$6	$6	$6	1.00	$0	$0	$0
Equipment	1	1		EA	$500	$500	$500	1.00	$500	$500	$0
Pipes				SF	$10	$10	$10	1.00	$0	$0	$0
									$25,780	**$25,780**	**$0**
6 Splitter/Selectors											
Excavation		77	77	CY	$30	$30	$30	1.00	$0	$2,310	$2,310
Rock Excavation		650	650	CY	$100	$100	$100	1.00	$0	$65,000	$65,000
Concrete											
Structural fill		45	45	CY	$30	$30	$30	1.00	$0	$1,350	$1,350
Slab on soil		35	35	CY	$400	$400	$400	1.00	$0	$14,000	$14,000
Shored slab		10	10	CY	$1,100	$1,100	$1,100	1.00	$0	$11,000	$11,000
Straight walls		115	115	CY	$750	$750	$750	1.00	$0	$86,250	$86,250
Concrete fill				CY	$400	$400	$400	1.00	$0	$0	$0

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Misc concrete		10	10	CY	$750	$750	$750	1.00	$0	$7,500	$7,500
Stairs and railings		160	160	LF	$75	$75	$75	1.00	$0	$12,000	$12,000
Miscellaneous metals		1	1	LS	$10,000	$10,000	$10,000	1.00	$0	$10,000	$10,000
Equipment Installation											
Submersible mixers		4	4	EA	$7,500	$7,500	$7,500	1.25	$0	$37,500	$37,500
Recycle pump		1	1	EA	$5,000	$5,000	$5,000	1.25	$0	$6,250	$6,250
Piping and Valves											
10" Influent		50	50	LF	$125	$125	$125	1.00	$0	$6,250	$6,250
6" Drain		50	50	LF	$100	$100	$100	1.00	$0	$5,000	$5,000
15" Bypass		40	40	LF	$150	$150	$150	1.00	$0	$6,000	$6,000
6" RAS		90	90	LF	$125	$125	$125	1.00	$0	$11,250	$11,250
8" Air		20	20	LF	$75	$75	$75	1.00	$0	$1,500	$1,500
12" Aeration Basin Influent		50	50	LF	$150	$150	$150	1.00	$0	$7,500	$7,500
4" Recycle		130	130	LF	$75	$75	$75	1.00	$0	$9,750	$9,750
Non-actuated valves		12	12	EA	$1,250	$1,250	$1,250	1.00	$0	$15,000	$15,000
Process gates		8	8	EA	$3,500	$3,500	$3,500	1.20	$0	$33,600	$33,600
Piping and Valves-Yard											
10" Influent		50	50	LF	$225	$225	$225	1.20	$0	$13,500	$13,500
10" Effluent		150	150	LF	$225	$225	$225	1.20	$0	$40,500	$40,500
Non-actuated valves		5	5	EA	$1,250	$1,250	$1,250	1.20	$0	$7,500	$7,500
Painting											
Pipes		100	100	SF	$10	$10	$10	1.00	$0	$1,000	$1,000
									$0	**$411,510**	**$411,510**
7 Secondary Treatment											
7A Demolition of RBC Units											
RBC Shaft and Media Removal	8	8	8	EA	$2,500	$2,500	$2,500	1.00	$20,000	$20,000	$20,000
Concrete		285	285	CY	$100	$100	$100	1.00	$0	$28,500	$28,500
Other Equipment	1	1	1	LS	$2,000	$2,000	$2,000	1.00	$2,000	$2,000	$2,000
Electrical	1	1	1	LS	$2,500	$2,500	$2,500	1.00	$2,500	$2,500	$2,500
									$24,500	**$53,000**	**$53,000**
7B Upgrades to Existing RBCs											
Structural modifications	1			LS	$5,000	$5,000	$5,000	1.00	$5,000	$0	$0
Equipment											
Media and Shafts - Standard	6			EA	$88,000	$88,000	$88,000	1.15	$607,200	$0	$0
Media and Shafts - High	2			EA	$135,000	$135,000	$135,000	1.15	$310,500	$0	$0
Covers	8			EA	$12,000	$12,000	$12,000	1.10	$105,600	$0	$0
Baffles	1			LS	$5,000	$5,000	$5,000	1.00	$5,000	$0	$0
Diffusers	3120			SF	$15	$15	$15	1.00	$46,800	$0	$0
Blowers	2			EA	$15,000	$15,000	$15,000	1.00	$30,000	$0	$0
Piping and Valves											
Piping Modifications				LS		$0	$0	1.00	$0	$0	$0
Non-actuated valves				EA	$1,250	$1,250	$1,250	1.20	$0	$0	$0
Actuated valves				EA	$1,500	$1,500	$1,500	1.20	$0	$0	$0
									$1,110,100	**$0**	**$0**
7C New RBC Train											
Excavation	115			CY	$30	$30	$30	1.00	$3,450	$0	$0
Rock Excavation	914			CY	$100	$100	$100	1.00	$91,400	$0	$0
Concrete											
Structural fill	232			CY	$25	$25	$25	1.00	$5,800	$0	$0
Slab on soil	80			CY	$450	$450	$450	1.00	$36,000	$0	$0
Straight walls	62			CY	$675	$675	$675	1.00	$41,850	$0	$0
Misc concrete	10			CY	$500	$500	$500	1.00	$5,000	$0	$0

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Stairs and railings	10			LF	$75	$75	$75	1.00	$750	$0	$0
Miscellaneous metals	1			LS	$10,000	$10,000	$10,000	1.00	$10,000	$0	$0
Grating	100			SF	$50	$50	$50	1.00	$5,000	$0	$0
Equipment Install											
Media and Shafts - Standard	3			EA	$88,000	$88,000	$88,000	1.25	$330,000	$0	$0
Media and Shafts - High	1			EA	$135,000	$135,000	$135,000	1.25	$168,750	$0	$0
Covers	4			EA	$12,000	$12,000	$12,000	1.25	$60,000	$0	$0
Baffles	1			LS	$2,500	$2,500	$2,500	1.25	$3,125	$0	$0
Diffusers	1,560			SF	$15	$15	$15	1.25	$29,250	$0	$0
Piping, Valves and Gates											
Influent piping	50			LF	$200	$200	$200	1.00	$10,000	$0	$0
Effluent piping	50			LF	$200	$200	$200	1.00	$10,000	$0	$0
Bypass piping	50			LF	$200	$200	$200	1.00	$10,000	$0	$0
Manual valves	3			EA	$1,250	$1,250	$1,250	1.00	$3,750	$0	$0
Automated valves	0			EA	$1,500	$1,500	$1,500	1.20	$0	$0	$0
Process gates	2			EA	$3,500	$3,500	$3,500	1.20	$8,400	$0	$0
Painting											
Structure surfaces				SF	$5	$5	$5	1.00	$0	$0	$0
Pipes	150			SF	$10	$10	$10	1.00	$1,500	$0	$0
Equipment	8			EA	$250	$250	$250	1.00	$2,000	$0	$0
									$836,025	**$0**	**$0**
7D ***New Aeration Basins***											
Excavation		124	145	CY	$30	$30	$30	1.00	$0	$3,720	$4,350
Rock Excavation		2,150	2,540	CY	$100	$100	$100	1.00	$0	$215,000	$254,000
Concrete											
Structural fill		75	110	CY	$25	$25	$25	1.00	$0	$1,875	$2,750
Slab on soil		136	164	CY	$450	$450	$450	1.00	$0	$61,200	$73,800
Straight walls		277	308	CY	$675	$675	$675	1.00	$0	$186,975	$207,900
Misc concrete		10	10	CY	$500	$500	$500	1.00	$0	$5,000	$5,000
Miscellaneous metals		1	1	LS	$10,000	$10,000	$10,000	1.00	$0	$10,000	$10,000
Grating		89	101	SF	$50	$50	$50	1.00	$0	$4,450	$5,050
Railings		200	300	LF	$75	$75	$75	1.00	$0	$15,000	$22,500
Stairs		10	10	LF	$175	$175	$175	1.00	$0	$1,750	$1,750
Equipment Install											
Diffusers		1,344	1,856	SF	$25	$25	$25	1.25	$0	$42,000	$58,000
Piping and Gates											
Influent piping		50	40	LF	$200	$200	$200	1.00	$0	$10,000	$8,000
Effluent piping		60	50	LF	$200	$200	$200	1.00	$0	$12,000	$10,000
Bypass piping		48	58	LF	$125	$125	$125	1.00	$0	$6,000	$7,250
Aeration piping		38	48	LF	$200	$200	$200	1.00	$0	$7,600	$9,600
Manual valves		3	3	EA	$1,250	$1,250	$1,250	1.00	$0	$3,750	$3,750
Automated valves		2	2	EA	$1,500	$1,500	$1,500	1.20	$0	$3,600	$3,600
Process gates		3	3	EA	$3,500	$3,500	$3,500	1.20	$0	$12,600	$12,600
Piping and Valves -Yard											
10" Influent		50	50	LF	$200	$200	$200	1.00	$0	$10,000	$10,000
10" Effluent		50	50	LF	$200	$200	$200	1.00	$0	$10,000	$10,000
6" RAS		300	300	LF	$125	$125	$125	1.00	$0	$37,500	$37,500
4" WAS		110	110	LF	$100	$100	$100	1.00	$0	$11,000	$11,000
6" Primary		240	240	LF	$125	$125	$125	1.00	$0	$30,000	$30,000
10" Aeration piping		120	120	LF	$200	$200	$200	1.00	$0	$24,000	$24,000
Manual valves		5	5	EA	$3,500	$3,500	$3,500	1.20	$0	$21,000	$21,000
Painting											

City of Fennimore
WWTP Facilities Planning
Capital Costs for WWTP Upgrade Alternatives

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Structure surfaces				SF	$5	$5	$5	1.00	$0	$0	$0
Pipes		100	100	SF	$10	$10	$10	1.00	$0	$1,000	$1,000
Equipment				EA	$15,000	$15,000	$15,000	1.00	$0	$0	$0
									$0	**$747,020**	**$844,400**
8 Process Building (Blowers/RAS/WAS)											
New Building Construction											
Excavation		153	153	CY	$30	$30	$30	1.00	$0	$4,590	$4,590
Rock Excavation		675	675	CY	$100	$100	$100	1.00	$0	$67,500	$67,500
Concrete											
Structural fill		262	262	CY	$25	$25	$25	1.00	$0	$6,550	$6,550
Circular walls		0	0	CY	$675	$675	$675	1.00	$0	$0	$0
Straight walls		50	50	CY	$600	$600	$600	1.00	$0	$30,000	$30,000
Slab on soil		108	108	CY	$400	$400	$400	1.00	$0	$43,200	$43,200
Shored slab		4	4	CY	$1,100	$1,100	$1,100	1.00	$0	$4,400	$4,400
Shored beams		0	0	CY	$1,700	$1,700	$1,700	1.00	$0	$0	$0
Columns		0	0	CY	$1,150	$1,150	$1,150	1.00	$0	$0	$0
Concrete fill		10	10	CY	$400	$400	$400	1.00	$0	$4,000	$4,000
Misc concrete		5	5	CY	$750	$750	$750	1.00	$0	$3,750	$3,750
Block walls - split face		1990	1990	SF	$30	$30	$30	1.00	$0	$59,700	$59,700
Block wall - plain		750	750	SF	$20	$20	$20	1.00	$0	$15,000	$15,000
Concrete plank		2400	2400	SF	$15	$15	$15	1.00	$0	$36,000	$36,000
Roofing		2400	2400	SF	$20	$20	$20	1.00	$0	$48,000	$48,000
Architectural		2400	2400	SF	$20	$20	$20	1.00	$0	$48,000	$48,000
Stairs and railings		25	25	LF	$200	$200	$200	1.00	$0	$5,000	$5,000
Miscellaneous metals		1	1	LS	$5,000	$5,000	$5,000	1.00	$0	$5,000	$5,000
Equipment Installation											
Aeration blowers		3	3	EA	$25,000	$25,000	$25,000	1.20	$0	$90,000	$90,000
RAS/WAS pumps		4	4	EA	$17,500	$17,500	$17,500	1.20	$0	$84,000	$84,000
Piping and Valves - Interior											
10" Air		150	150	LF	$125	$125	$125	1.00	$0	$18,750	$18,750
8" RAS		80	80	LF	$100	$100	$100	1.00	$0	$8,000	$8,000
4" WAS		40	40	LF	$90	$90	$90	1.00	$0	$3,600	$3,600
Manual valves - Air		10	10	EA	$650	$650	$650	1.00	$0	$6,500	$6,500
Automated valves - Air		3	3	EA	$3,500	$3,500	$3,500	1.20	$0	$12,600	$12,600
Automated valves - RAS/WAS		20	20	EA	$3,500	$3,500	$3,500	1.20	$0	$84,000	$84,000
Painting											
Room		6250	6250	SF	$5	$5	$5	1.00	$0	$31,250	$31,250
Equipment		7	7	EA	$500	$500	$500	1.00	$0	$3,500	$3,500
Pipes		1000	1000	SF	$10	$10	$10	1.00	$0	$10,000	$10,000
HVAC		2400	2400	SF	$30	$30	$30	1.00	$0	$72,000	$72,000
Plumbing		2400	2400	SF	$10	$10	$10	1.00	$0	$24,000	$24,000
									$0	**$828,890**	**$828,890**
9 Chemical Feed											
Tuckpointing/Exterior Repairs	1	1	1	LS	$7,500	$7,500	$7,500	1.00	$7,500	$7,500	$7,500
Equipment											
Chemical Feed Pumps	2	2	3	EA	$3,500	$3,500	$3,500	1.25	$8,750	$8,750	$13,125
Chemical Storage Tanks	1	1	2	EA	$2,500	$2,500	$2,500	1.25	$3,125	$3,125	$6,250
Process Piping											
3" PVC Carrier	100	100	150	LF	$40	$40	$40	1.00	$4,000	$4,000	$6,000
Chemical Feed Tubing	200	200	300	LF	$15	$15	$15	1.00	$3,000	$3,000	$4,500
Valves	2	2	3	EA	$175	$175	$175	1.00	$350	$350	$525
Plumbing	400	400	400	SF	$15	$15	$15	1.00	$6,000	$6,000	$6,000

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Painting - Structure	800	800	800	SF	$5	$5	$5	1.00	$4,000	$4,000	$4,000
HVAC	400	400	400	SF	$50	$50	$50	1.00	$20,000	$20,000	$20,000
									$56,725	**$56,725**	**$67,900**
10 Final Clarifiers											
10A Construction - Third Clarifier											
Excavation		46	46	CY	$30	$30	$30	1.00	$0	$1,380	$1,380
Rock Excavation		789	789	CY	$100	$100	$100	1.00	$0	$78,900	$78,900
Structural fill				CY	$20	$20	$20	1.00	$0	$0	$0
Circular walls		57	57	CY	$675	$675	$675	1.00	$0	$38,475	$38,475
Straight walls				CY	$600	$600	$600	1.00	$0	$0	$0
Slab on soil		45	45	CY	$400	$400	$400	1.00	$0	$18,000	$18,000
Shored slab				CY	$1,100	$1,100	$1,100	1.00	$0	$0	$0
Shored beams				CY	$1,700	$1,700	$1,700	1.00	$0	$0	$0
Columns				CY	$1,150	$1,150	$1,150	1.00	$0	$0	$0
Concrete fill				CY	$400	$400	$400	1.00	$0	$0	$0
Misc concrete				CY	$750	$750	$750	1.00	$0	$0	$0
Stairs and railings		93	93	LF	$75	$75	$75	1.00	$0	$6,975	$6,975
Hatchways				EA	$1,000	$1,000	$1,000	1.00	$0	$0	$0
Miscellaneous metals		1	1	LS	$10,000	$10,000	$10,000	1.00	$0	$10,000	$10,000
Equipment											
Clarifier Mechanism		1	1	EA	$100,000	$100,000	$100,000	1.20	$0	$120,000	$120,000
Weirs and baffles		1	1	EA	$7,500	$7,500	$7,500	1.20	$0	$9,000	$9,000
Aluminum covers		1	1	EA	$50,000	$50,000	$50,000	1.25	$0	$62,500	$62,500
Piping and Valves - Interior											
10" Influent		14	14	LF	$200	$200	$200	1.00	$0	$2,800	$2,800
Effluent		5	5	LF	$200	$200	$200	1.00	$0	$1,000	$1,000
6" Sludge		24	24	LF	$100	$100	$100	1.00	$0	$2,400	$2,400
6" Scum		22	22	LF	$100	$100	$100	1.00	$0	$2,200	$2,200
Non-actuated valves		2	2	EA	$650	$650	$650	1.00	$0	$1,300	$1,300
Actuated valves		1	1	EA	$3,000	$3,000	$3,000	1.20	$0	$3,600	$3,600
Process gates		1	1	EA	$3,500	$3,500	$3,500	1.20	$0	$4,200	$4,200
Piping and Valves-Yard											
10" Influent		30	30		$225	$225	$225	1.00	$0	$6,750	$6,750
10" Effluent		10	10		$225	$225	$225	1.00	$0	$2,250	$2,250
6" RAS		70	70		$125	$125	$125	1.00	$0	$8,750	$8,750
Painting											
Structure surfaces				SF	$5	$5	$5	1.00	$0	$0	$0
Pipes		100	100	SF	$10	$10	$10	1.00	$0	$1,000	$1,000
Equipment		1	1	EA	$30,000	$30,000	$30,000	1.00	$0	$30,000	$30,000
									$0	**$411,480**	**$411,480**
10B Upgrades - Existing Clarifiers											
Demolition - Scraper Removal		2	2	EA	$0	$0	$0	1.00	$0	$0	$0
Scraper assemblies		2	2	EA	$0	$0	$0	1.20	$0	$0	$0
Drive Replacement		0	0	EA	$0	$0	$0	1.20	$0	$0	$0
Stuctural - Baffles		1	1	LS	$0	$0	$0	1.00	$0	$0	$0
Piping Modifications		1	1	LS	$0	$0	$0	1.00	$0	$0	$0
									$0	**$0**	**$0**
11 Tertiary Filtration											
11A Demolition of Existing Filter											
Demolition											
Blower removal	2	2	2	EA	$1,250	$1,250	$1,250	1.00	$2,500	$2,500	$2,500

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
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Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Pump removal	2	2	2	EA	$1,000	$1,000	$1,000	1.00	$2,000	$2,000	$2,000
Media removal	1,092	1,092	1,092	CF	$10	$10	$10	1.00	$10,920	$10,920	$10,920
Media disposal	40	40	40	CY	$75	$75	$75	1.00	$3,000	$3,000	$3,000
Torch superstructure	1	1	1	LS	$7,500	$7,500	$7,500	1.00	$7,500	$7,500	$7,500
Remove metal	1	1	1	LS	$5,000	$5,000	$5,000	1.00	$5,000	$5,000	$5,000
Electrical	1	1	1	LS	$5,000	$5,000	$5,000	1.00	$5,000	$5,000	$5,000
Piping	200	200	200	LF	$30	$30	$30	1.00	$6,000	$6,000	$6,000
Room Rehab											
Concrete/masonry repair	1	1	1	LS	$2,500	$2,500	$2,500	1.00	$2,500	$2,500	$2,500
Painting	2,750	2,750	2,750	SF	$6	$6	$6	1.00	$16,500	$16,500	$16,500
									$60,920	**$60,920**	**$60,920**
11B Construction of New Filter											
Construction											
Concrete	15			CY	$650	$650	$650	1.00	$9,750	$0	$0
Misc Metals	1			LS	$5,000	$5,000	$5,000	1.00	$5,000	$0	$0
Filter Supports	4			EA	$5,000	$5,000	$5,000	1.00	$20,000	$0	$0
Temporary Wall Opening	1			LS	$15,000	$15,000	$15,000	1.00	$15,000	$0	$0
Equipment											
Filter System	2			EA	$220,000	$220,000	$220,000	1.10	$484,000	$0	$0
Flash Mixer	1			EA	$5,000	$5,000	$5,000	1.20	$6,000	$0	$0
Floc Tank Mixer	2			EA	$7,500	$7,500	$7,500	1.20	$18,000	$0	$0
Polymer System	1			EA	$12,000	$12,000	$12,000	1.20	$14,400	$0	$0
Piping and Valves - Interior											
Effluent	100			LF	$200	$200	$200	1.00	$20,000	$0	$0
Process Drain	50			LF	$80	$80	$80	1.00	$4,000	$0	$0
Backwash	50			LF	$50	$50	$50	1.00	$2,500	$0	$0
Polymer Feed	30			LF	$25	$25	$25	1.00	$750	$0	$0
Valves	5			EA	$2,500	$2,500	$2,500	1.00	$12,500	$0	$0
Painting											
Pipes	500			SF	$10	$10	$10	1.00	$5,000	$0	$0
HVAC	800			SF	$50	$50	$50	1.00	$40,000	$0	$0
									$656,900	**$0**	**$0**
12 Solids Handling/Thickening											
New Building Construction - Phase 3											
Construction											
Excavation		63	63	CY	$30	$30	$30	1.00	$0	$1,890	$1,890
Rock Excavation		657	657	CY	$100	$100	$100	1.00	$0	$65,700	$65,700
Structural Fill				CY	$25	$25	$25	1.00	$0	$0	$0
Footings		15	15	CY	$400	$400	$400	1.00	$0	$6,000	$6,000
Slab on soil		20	20	CY	$550	$550	$550	1.00	$0	$11,000	$11,000
Foundation walls		25	25	CY	$650	$650	$650	1.00	$0	$16,250	$16,250
Stoops		5	5	CY	$750	$750	$750	1.00	$0	$3,750	$3,750
Block wall - split face		1,300	1,300	SF	$35	$35	$35	1.00	$0	$45,500	$45,500
Concrete planking		750	750	SF	$18	$18	$18	1.00	$0	$13,125	$13,125
Roofing		750	750	SF	$22	$22	$22	1.00	$0	$16,500	$16,500
Architectural		750	750	SF	$20	$20	$20	1.00	$0	$15,000	$15,000
Stairs		12	12	LF	$150	$150	$150	1.25	$0	$2,250	$2,250
Railings		32	32	LF	$50	$50	$50	1.25	$0	$2,000	$2,000
Equipment											
DAF Feed Pumps		2	2	EA	$17,500	$17,500	$17,500	1.25	$0	$43,750	$43,750
Polymer System		1	1	EA	$14,000	$14,000	$14,000	1.30	$0	$18,200	$18,200
Polymer spare parts		1	1	LS	$5,000	$5,000	$5,000	1.00	$0	$5,000	$5,000

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
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Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
DAF Thickener		1	1	EA	$225,000	$225,000	$225,000	1.15	$0	$258,750	$258,750
TWAS Pumps		2	2	EA	$17,500	$17,500	$17,500	1.25	$0	$43,750	$43,750
Beam and hoist		1	1	EA	$12,500	$12,500	$12,500	1.25	$0	$15,625	$15,625
Piping and Valves - Interior											
Sludge Feed		100	100	LF	$100	$100	$100	1.00	$0	$10,000	$10,000
Process Drain		100	100	LF	$100	$100	$100	1.00	$0	$10,000	$10,000
TWAS		125	125	LF	$100	$100	$100	1.00	$0	$12,500	$12,500
Polymer Feed		30	30	LF	$25	$25	$25	1.00	$0	$750	$750
Valves		6	6	EA	$900	$900	$900	1.00	$0	$5,400	$5,400
Piping and Valves - Yard											
6" Primary Sludge Feed		120	120	LF	$100	$100	$100	1.00	$0	$12,000	$12,000
10" Digester		70	70	LF	$225	$225	$225	1.00	$0	$15,750	$15,750
Painting											
Structure surfaces		2500	2500	SF	$5	$5	$5	1.00	$0	$12,500	$12,500
Pipes		250	250	SF	$10	$10	$10	1.00	$0	$2,500	$2,500
Equipment		4	4	EA	$500	$500	$500	1.00	$0	$2,000	$2,000
HVAC		750	750	SF	$50	$50	$50	1.00	$0	$37,500	$37,500
Plumbing		750	750	SF	$15	$15	$15	1.00	$0	$11,250	$11,250
									$0	**$716,190**	**$716,190**
13 Digester Complex											
13A Rehab of Existing Anaerobic Digester											
Demolition											
Boiler/Heat Xchgr	1	1		LS	$4,000	$4,000	$4,000	1.00	$4,000	$4,000	$0
Gas train	1	1		LS	$4,000	$4,000	$4,000	1.00	$4,000	$4,000	$0
Digester mixing system	1	1		EA	$1,500	$1,500	$1,500	1.00	$1,500	$1,500	$0
Equipment Install											
Boiler/Heat Xchgr	1	1		EA	$150,000	$150,000	$150,000	1.10	$165,000	$165,000	$0
Gas train	1	1		EA	$75,000	$75,000	$75,000	1.15	$86,250	$86,250	$0
Digester mixing system	1	1		EA	$75,000	$75,000	$75,000	1.20	$90,000	$90,000	$0
Primary sludge pumps	2	2		EA	$22,500	$22,500	$22,500	1.20	$54,000	$54,000	$0
Sludge recirculation pumps	2	2		EA	$17,500	$17,500	$17,500	1.20	$42,000	$42,000	$0
Cover Rehab/Replacement											
Cover Rehab	1	1		EA	$75,000	$75,000	$75,000	1.15	$86,250	$86,250	$0
Painting Cover	1	1		LS	$45,000	$45,000	$45,000	1.00	$45,000	$45,000	$0
Tuckpointing/Exterior Repairs	1	1		LS	$7,500	$7,500	$7,500	1.00	$7,500	$7,500	$0
Existing Roof Modifications	1	1		LS	$1,500	$1,500	$1,500	1.00	$1,500	$1,500	$0
Process Piping											
Sludge Feed	100	100		LF	$100	$100	$100	1.00	$10,000	$10,000	$0
Valves	6	6		EA	$950	$950	$950	1.00	$5,700	$5,700	$0
Construction - Gas Handling Room											
Excavation	90	90		CY	$30	$30	$30	1.00	$2,700	$2,700	$0
Structural Fill	20	20		CY	$25	$25	$25	1.00	$500	$500	$0
Footings	4	4		CY	$400	$400	$400	1.00	$1,600	$1,600	$0
Slab on soil	6	6		CY	$550	$550	$550	1.00	$3,300	$3,300	$0
Foundation walls	8	8		CY	$650	$650	$650	1.00	$5,200	$5,200	$0
Stoops	4	4		CY	$750	$750	$750	1.00	$3,000	$3,000	$0
Block wall - split face	400	400		SF	$35	$35	$35	1.00	$14,000	$14,000	$0
Concrete planking	188	188		SF	$18	$18	$18	1.00	$3,290	$3,290	$0
Roofing	188	188		SF	$22	$22	$22	1.00	$4,136	$4,136	$0
Architectural	188	188		SF	$20	$20	$20	1.00	$3,760	$3,760	$0
Stairs	20	20		LF	$225	$225	$225	1.25	$5,625	$5,625	$0
Railings	35	35		LF	$50	$50	$50	1.25	$2,188	$2,188	$0

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Painting											
Structure surfaces	1250	1250		SF	$8	$8	$8	1.00	$10,000	$10,000	$0
Pipes	250	250		SF	$10	$10	$10	1.00	$2,500	$2,500	$0
Equipment	8	8		EA	$125	$125	$125	1.00	$1,000	$1,000	$0
HVAC	450	450		SF	$75	$75	$75	1.00	$33,750	$33,750	$0
Plumbing	450	450		SF	$15	$15	$15	1.00	$6,750	$6,750	$0
Interim Sludge Processing	1	1		LS	$150,000	$150,000	$150,000	1.00	$150,000	$150,000	$0
									$855,999	**$855,999**	**$0**
13B Conversion to Aerobic Digestion											
Demolition											
Boiler/Heat Xchgr			1	LS			$4,000	1.00	$0	$0	$4,000
Piping			106	LF			$25	1.00	$0	$0	$2,650
Gas train			1	LS			$4,000	1.00	$0	$0	$4,000
Digester mixing system			1	EA			$2,500	1.00	$0	$0	$2,500
Cover removal			1	LS			$17,500	1.00	$0	$0	$17,500
Structural Modifications			1	LS			$7,500	1.00	$0	$0	$7,500
Tuckpointing/Exterior Repairs			1	LS			$7,500	1.00	$0	$0	$7,500
Equipment Install									$0	$0	
Blowers			2	EA			$30,000	1.20	$0	$0	$72,000
Diffusers			1,590	SF			$30	1.20	$0	$0	$57,240
Cover			1	EA			$75,000	1.20	$0	$0	$90,000
Sludge Pumps			2	EA			$17,500	1.20	$0	$0	$42,000
Piping and Valves									$0	$0	
Sludge Feed			100	LF			$100	1.00	$0	$0	$10,000
Air Piping			80	LF			$100	1.00	$0	$0	$8,000
Valves			15	EA			$950	1.00	$0	$0	$14,250
Plumbing			270	SF			$15	1.00	$0	$0	$4,050
HVAC			270	SF			$75	1.00	$0	$0	$20,250
Painting											
Structure surfaces			700	SF			$5	1.00	$0	$0	$3,500
Pipes			250	SF			$10	1.00	$0	$0	$2,500
Equipment			5	EA			$125	1.00	$0	$0	$625
									$0	**$0**	**$370,065**
14 Sludge Storage											
No Modifications Planned											
									$0	**$0**	**$0**
15 Waste Receiving Station											
Construction											
Excavation	48	48	48	CY	$30	$30	$30	1.00	$1,440	$1,440	$1,440
Rock Excavation	337	337	337	CY	$100	$100	$100	1.00	$33,700	$33,700	$33,700
Structural Fill	60	60	60	CY	$25	$25	$25	1.00	$1,500	$1,500	$1,500
Straight walls	85	85	85	CY	$675	$675	$675	1.00	$57,375	$57,375	$57,375
Slab on grade	40	40	40	CY	$450	$450	$450	1.00	$18,000	$18,000	$18,000
Shored slab	40	40	40	CY	$1,100	$1,100	$1,100	1.00	$44,000	$44,000	$44,000
Concrete Fill	15	15	15	CY	$500	$500	$500	1.00	$7,500	$7,500	$7,500
Misc concrete	10	10	10	CY	$500	$500	$500	1.00	$5,000	$5,000	$5,000
Stairs and railings	0	0	0	EA	$75	$75	$75	1.00	$0	$0	$0
Access hatches	5	5	5	EA	$1,250	$1,250	$1,250	1.20	$7,500	$7,500	$7,500
Equipment											
Bar Rack	1	1	1	EA	$14,000	$14,000	$14,000	1.30	$18,200	$18,200	$18,200
Screening	0	0	0	EA	$225,000	$225,000	$225,000	1.15	$0	$0	$0
Submersible pumps	2	2	2	EA	$7,500	$7,500	$7,500	1.25	$18,750	$18,750	$18,750

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Diffusers	8	8	8	EA	$200	$200	$200	1.25	$2,000	$2,000	$2,000
Blower	1	1	1	EA	$5,000	$5,000	$5,000	1.25	$6,250	$6,250	$6,250
Sound Enclosure	1	1	1	EA	$3,000	$3,000	$3,000	1.25	$3,750	$3,750	$3,750
Mechanical gates	2	2	2	EA	$3,750	$3,750	$3,750	1.20	$9,000	$9,000	$9,000
Piping											
2" Air	50	50	50	LF	$75	$75	$75	1.00	$3,750	$3,750	$3,750
4" Septage to Headworks	200	200	200	LF	$100	$100	$100	1.00	$20,000	$20,000	$20,000
4" Septage to Digester	100	100	100	LF	$100	$100	$100	1.00	$10,000	$10,000	$10,000
6" Drain To Headworks	200	200	200	LF	$100	$100	$100	1.00	$20,000	$20,000	$20,000
Valves	6	6	6	EA	$900	$900	$900	1.00	$5,400	$5,400	$5,400
									$293,115	**$293,115**	**$293,115**
16 Lab/Process Building											
Demolition											
Lab cabinets and equip removal	1	1	1	LS	$4,500	$4,500	$4,500	1.00	$4,500	$4,500	$4,500
HVAC	1	1	1	LS	$4,500	$4,500	$4,500	1.00	$4,500	$4,500	$4,500
Bathroom fixtures	1	1	1	LS	$2,250	$2,250	$2,250	1.00	$2,250	$2,250	$2,250
Partition walls	60	60	60	SF	$25	$25	$25	1.00	$1,500	$1,500	$1,500
Ceiling	100	100	100	SF	$20	$20	$20	1.00	$2,000	$2,000	$2,000
Expanded Bathroom											
New fixtures	1	1	1	LS	$3,500	$3,500	$3,500	1.00	$3,500	$3,500	$3,500
New door	1	1	1	EA	$750	$750	$750	1.20	$900	$900	$900
New wall treatment	100	100	100	SF	$10	$10	$10	1.00	$1,000	$1,000	$1,000
Floor	80	80	80	SF	$20	$20	$20	1.00	$1,600	$1,600	$1,600
New ceiling	80	80	80	SF	$12	$12	$12	1.00	$960	$960	$960
Plumbing	142	142	142	SF	$12	$12	$12	1.00	$1,704	$1,704	$1,704
Lab Upgrade											
New wall	120	120	120	SF	$15	$15	$15	1.00	$1,800	$1,800	$1,800
New ceiling	270	270	270	SF	$10	$10	$10	1.00	$2,700	$2,700	$2,700
New cabinets	1	1	1	LS	$25,000	$25,000	$25,000	1.00	$25,000	$25,000	$25,000
Lab equipment allowance	1	1	1	LS	$15,000	$15,000	$15,000	1.00	$15,000	$15,000	$15,000
Windows and Doors	1	1	1	LS	$8,000	$8,000	$8,000	1.00	$8,000	$8,000	$8,000
Painting	528	528	528	SF	$8	$8	$8	1.00	$4,224	$4,224	$4,224
Flooring	270	270	270	SF	$10	$10	$10	1.00	$2,700	$2,700	$2,700
Building Roofing	2240	2240	2240	SF	$7.50	$7.50	$7.50	1.00	$16,800	$16,800	$16,800
Plumbing	1000	1000	1000	SF	$20.00	$20.00	$20.00	1.00	$20,000	$20,000	$20,000
HVAC	1000	1000	1000	SF	$50.00	$50.00	$50.00	1.00	$50,000	$50,000	$50,000
									$170,638	**$170,638**	**$170,638**
17 Garage											
17A Modify Existing Garage											
HVAC	1728	1728	1728	SF	$35	$35	$35	1.00	$60,480	$60,480	$60,480
Insulation	2352	2352	2352	SF	$7	$7	$7	1.00	$16,464	$16,464	$16,464
									$76,944	**$76,944**	**$76,944**
17B New Construction											
Excavation	100	100	100	CY	$30	$30	$30	1.00	$3,000	$3,000	$3,000
Rock Excavation	500	500	500	CY	$30	$30	$30	1.00	$15,000	$15,000	$15,000
Structural fill	100	100	100	CY	$25	$25	$25	1.00	$2,500	$2,500	$2,500
Circular walls	0	0	0	CY	$675	$675	$675	1.00	$0	$0	$0
Straight walls	34	34	34	CY	$600	$600	$600	1.00	$20,400	$20,400	$20,400
Slab on soil	85	85	85	CY	$400	$400	$400	1.00	$34,000	$34,000	$34,000
Shored slab	0	0	0	CY	$1,100	$1,100	$1,100	1.00	$0	$0	$0
Shored beams	0	0	0	CY	$1,700	$1,700	$1,700	1.00	$0	$0	$0

City of Fennimore
WWTP Facilities Planning
Capital Costs for WWTP Upgrade Alternatives

Alternative 1 - Replace Existing RBCs, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 2 - Conventional Activated Sludge, Maintain Primary Clarifiers and Anaerobic Digestion
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

	Qty				Unit Cost			Install	Total Cost		
	Alt 1	Alt 2	Alt 3	Units	Alt 1	Alt 2	Alt 3	Factor	Alt 1	Alt 2	Alt 3
Columns	5	5	5	CY	$1,150	$1,150	$1,150	1.00	$5,750	$5,750	$5,750
Concrete fill	5	5	5	CY	$400	$400	$400	1.00	$2,000	$2,000	$2,000
Misc concrete	5	5	5	SF	$750	$750	$750	1.00	$3,750	$3,750	$3,750
Block walls - split face	2,310	2,310	2,310	SF	$30	$30	$30	1.00	$69,300	$69,300	$69,300
Block wall - plain	0	0	0	SF	$20	$20	$20	1.00	$0	$0	$0
Concrete plank	416	416	416	SF	$15	$15	$15	1.00	$6,240	$6,240	$6,240
FRP laminated ceiling	1,600	1,600	1,600	SF	$8	$8	$8	1.00	$12,000	$12,000	$12,000
Roofing	1,600	1,600	1,600	SF	$20	$20	$20	1.00	$32,000	$32,000	$32,000
Architectural	1,600	1,600	1,600	LF	$20	$20	$20	1.00	$32,000	$32,000	$32,000
Stairs and railings	100	100	100	LF	$75	$75	$75	1.00	$7,500	$7,500	$7,500
Equipment Installation											
Welder	1	1	1	LS	$2,500	$2,500	$2,500	1.20	$3,000	$3,000	$3,000
High pressure washer	1	1	1	EA	$1,000	$1,000	$1,000	1.20	$1,200	$1,200	$1,200
Valves	0	0	0	LF	$1,500	$1,500	$1,500	1.00	$0	$0	$0
Painting											
Pipes	0	0	0	EA	$5	$5	$5	1.00	$0	$0	$0
HVAC	1,600	1,600	1,600	SF	$20	$20	$20	1.00	$32,000	$32,000	$32,000
Plumbing	1,600	1,600	1,600	LS	$10	$10	$10	1.00	$16,000	$16,000	$16,000
									$297,640	**$297,640**	**$297,640**

City of Fennimore
WWTP Facilities Planning
O&M Cost Analysis of Alternatives

Acct		2012 Actual	2013 Actual	2014 Actual	2015 Base Budget	Alternative 1 2016/2017 Startup	Alternative 1 Phase 1 Design	Alternative 2 2016/2017 Startup	Alternative 2 Phase 1 Design	Alternative 3 2016/2017 Startup	Alternative 3 Phase 1 Design
	Personnel	2	2	2		2	2	2	2	2	2
	Annual Average Flow (MGD)	0.197	0.247	0.251		0.252	0.382	0.252	0.382	0.252	0.382
	Design/Sustained Flow (MGD)	0.207	0.329	0.290		0.330	0.608	0.330	0.608	0.330	0.608
	BOD Load (lbs/day)	543	532	539		693	878	693	878	693	878
	TSS Load (lbs/day)	474	471	556		502	680	502	680	502	680
	TKN Load (lbs/day)					101	125	101	125	101	125
	Phosphorus Load (lbs/day)					18	22	18	22	18	22
	Alum Required (gal/day)		21	26		27	50	13	20	7	10
	Sludge Production (to Digest/Thicken) lbs/day					803	1,079	347	540	583	758
	gpd					5,017	6,668	8,330	12,951	13,974	18,184
	Liquid biosolids hauled (gal/year)				610,000	1,100,000	1,100,000	1,100,000	1,100,000	1,100,000	1,100,000
	Sludge Hauling (hours/year)				40	66	66	66	66	66	66
	Polymer - Sludge Thickening (lb/year)										
	Polymer - Filtration (lb/year)										
	Building Square Feet - Heated (Elect)	758	758	758		2,968	2,968	5,143	5,143	5,033	5,033
	Building Square Feet - Heated (Gas)	3,976	3,976	3,976		4,136	4,136	4,136	4,136	4,136	4,136
	Water usage (gal/year)	1,639,700	1,331,500	884,780	900,000	1,125,000	1,125,000	1,125,000	1,125,000	1,125,000	1,125,000
	LP Gas usage (gal/year)	5,343	9,758	13,604	8,824	8,824	8,824	8,824	8,824	7,059	7,059
	Electricity Usage (KWH)	355,400	357,600	393,800	396,104	895,051	901,128	605,264	699,653	937,250	1,037,470
Acct											
MISC:											
300340354000	Depreciation Expense (Replacement)	$ 136,336	$ 138,732	$ 95,000.0	$ 105,000.0	$ 105,000.0	$ 105,000.0	$ 105,000.0	$ 105,000.0	$ 105,000.0	$ 105,000.0
300342763000	Interest Expense	$ 6,110	$ 5,513	$ 4,620.0	$ 3,640.0	$ 3,640.0	$ 3,640.0	$ 3,640.0	$ 3,640.0	$ 3,640.0	$ 3,640.0
300342863600	Unamortized Issue Exp.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
200143162200	Int. on Customer Deposits	$ 1	$ 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Total Misc. Expenses	**$ 142,447**	**$ 144,248**	**$ 99,620.0**	**$ 108,640.0**	**$ 108,640.0**	**$ 108,640.0**	**$ 108,640.0**	**$ 108,640.0**	**$ 108,640.0**	**$ 108,640.0**
WASTEWATER TREATMENT PLANT:											
300382011000	Wages	$ 44,542	$ 46,020	$ 49,453	$ 49,000	$ 49,000	$ 49,000	$ 49,000	$ 49,000	$ 49,000	$ 49,000
300382015000	Social Security	$ 3,291	$ 3,588	$ 3,591	$ 3,600	$ 3,600	$ 3,600	$ 3,600	$ 3,600	$ 3,600	$ 3,600
300382015100	Pension	$ 5,229	$ 2,902	$ 3,326	$ 3,330	$ 3,330	$ 3,330	$ 3,330	$ 3,330	$ 3,330	$ 3,330
	Sludge Hauling - Extra Hours					$ 1,984	$ 1,984	$ 1,984	$ 1,984	$ 1,984	$ 1,984
300382122200	Utilities										
	Electrical - WWTP	$ 25,078	$ 25,700	$ 30,477	$ 30,500	$ 68,919	$ 69,387	$ 46,605	$ 53,873	$ 72,168	$ 79,885
	Water - WWTP	$ 5,567	$ 4,768	$ 3,608	$ 3,600	$ 4,500	$ 4,500	$ 4,500	$ 4,500	$ 4,500	$ 4,500
	Other (Fire Protection, Public Benefit)	$ 1,780	$ 1,780	$ 1,780	$ 1,780	$ 1,780	$ 1,780	$ 1,780	$ 1,780	$ 1,780	$ 1,780
	Utilities - Lift Stations	$ 2,123	$ 5,819	$ 1,809	$ 2,620	$ 2,620	$ 2,620	$ 2,123	$ 2,123	$ 2,620	$ 2,620
300382122400	Fuel (LP Gas - WWTP)	$ 2,342	$ 13,765	$ 22,134	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 12,000	$ 12,000
300382437600	Phosp. Rem. Chemicals	$ 16,302	$ 15,693	$ 19,417	$ 19,500	$ 19,906	$ 37,399	$ 10,000	$ 15,000	$ 5,000	$ 7,500
300382637600	Other Chemicals	$ 836	$ 518	$ -	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
300382722000	Phone	$ 1,455	$ 1,441	$ 1,626	$ 1,650	$ 1,650	$ 1,650	$ 1,650	$ 1,650	$ 1,650	$ 1,650
300382730000	Supplies	$ 2,402	$ 3,043	$ 3,188	$ 3,200	$ 3,200	$ 3,200	$ 3,200	$ 3,200	$ 3,200	$ 3,200
300382731100	Lab Supplies & Testing	$ 3,637	$ 4,258	$ 10,556	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
300383315000	Equip. Repair Social Security	$ 1,024	$ 900	$ 628	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750
300383315100	Equip. Repair Pension	$ 1,515	$ 687	$ 583	$ 600	$ 600	$ 600	$ 600	$ 600	$ 600	$ 600
300383336100	Equip. Repair & Wages	$ 26,318	$ 23,771	$ 22,691	$ 27,000	$ 27,000	$ 27,000	$ 27,000	$ 27,000	$ 27,000	$ 27,000
300383415000	Bldg/Plant Maint. Social Security	$ 430	$ 435	$ 444	$ 444	$ 444	$ 444	$ 444	$ 444	$ 444	$ 444
300383415100	Bldg/Plant Maint. Pension	$ 578	$ 303	$ 305	$ 450	$ 450	$ 450	$ 450	$ 450	$ 450	$ 450
300383436200	Bldg/Plant Maint & Wages	$ 10,658	$ 12,783	$ 16,784	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000
	Total Treatment Plant	**$ 155,107**	**$ 168,174**	**$ 192,400**	**$ 188,524**	**$ 230,233**	**$ 248,193**	**$ 197,516**	**$ 209,784**	**$ 215,576**	**$ 225,793**
TRANSPORTATION EXPENSES:											
300382815000	Social Security	$ 27	$ 21	$ 27	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
300382815100	Pension	$ 34	$ 19	$ 19	$ 20	$ 20	$ 20	$ 20	$ 20	$ 20	$ 20
300382853100	Wages & Repairs	$ 4,788	$ 8,143	$ 3,137	$ 3,150	$ 3,150	$ 3,150	$ 3,150	$ 3,150	$ 3,150	$ 3,150
	Total Transportation	**$ 4,849**	**$ 8,183**	**$ 3,183**	**$ 3,200**	**$ 3,200**	**$ 3,200**	**$ 3,200**	**$ 3,200**	**$ 3,200**	**$ 3,200**
COLLECTION SYSTEM:											
300383011000	Wages-Collection System	$ 5,708	$ 3,551	$ 2,583	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500
300383015000	Social Security	$ 418	$ 264	$ 192	$ 200	$ 200	$ 200	$ 200	$ 200	$ 200	$ 200
300383015100	Pension	$ 666	$ 225	$ 180	$ 200	$ 200	$ 200	$ 200	$ 200	$ 200	$ 200
300383115000	Repairs Social Security	$ 317	$ 81	$ 195	$ 200	$ 200	$ 200	$ 200	$ 200	$ 200	$ 200
300383115100	Repairs Pension	$ 435	$ 61	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180	$ 180

City of Fennimore
WWTP Facilities Planning
O&M Cost Analysis of Alternatives

		2012	2013	2014	2015	Alternative 1		Alternative 2		Alternative 3	
		Actual	Actual	Actual	Base Budget	2016/2017 Startup	Phase 1 Design	2016/2017 Startup	Phase 1 Design	2016/2017 Startup	Phase 1 Design
300383135500	Wages & Repairs	$ 8,987	$ 1,759	$ 3,402	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500
300383215000	Lift Station Social Security	$ 292	$ 293	$ 89	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
300383215100	Lift Station Pension	$ 457	$ 234	$ 80	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
300383235600	Lift Station Wages & Repair	$ 7,504	$ 10,909	$ 4,820	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
	Total Collection System	**$ 24,784**	**$ 17,377**	**$ 11,721**	**$ 22,980**	**$ 22,980**	**$ 22,980**	**$ 22,980**	**$ 22,980**	**$ 22,980**	**$ 22,980**
ACCOUNTING AND COLLECTIONS:											
300384011000	Wages	$ 20,200	$ 20,145	$ 20,779	$ 21,500	$ 21,500	$ 21,500	$ 21,500	$ 21,500	$ 21,500	$ 21,500
300384011300	Vacation, Personal	$ 2,579	$ 2,967	$ 2,438	$ 2,750	$ 2,750	$ 2,750	$ 2,750	$ 2,750	$ 2,750	$ 2,750
300384011400	Sick Pay	$ 1,013	$ 1,274	$ 1,511	$ 1,200	$ 1,200	$ 1,200	$ 1,200	$ 1,200	$ 1,200	$ 1,200
300384012000	Longevity & Misc. Pay	$ 469	$ 270	$ 289	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
300384015000	Social Security	$ 1,760	$ 1,788	$ 1,871	$ 1,900	$ 1,900	$ 1,900	$ 1,900	$ 1,900	$ 1,900	$ 1,900
300384015100	Pension	$ 2,372	$ 1,644	$ 1,748	$ 1,800	$ 1,800	$ 1,800	$ 1,800	$ 1,800	$ 1,800	$ 1,800
300384030000	Supplies	$ 2,192	$ 2,490	$ 4,385	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000
300384211000	Meter Reading Expense (40/30/30)	$ 11,210	$ 9,135	$ 10,503	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000
300384351500	Uncollectible Accts. Expense	$ 27	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Total Acctg & Collections	**$ 41,822**	**$ 39,713**	**$ 43,524**	**$ 39,450**	**$ 39,450**	**$ 39,450**	**$ 39,450**	**$ 39,450**	**$ 39,450**	**$ 39,450**
ADMINISTRATION & GENERAL EXPENSES											
300385011000	Wages	$ 8,725	$ 10,200	$ 16,070	$ 16,500	$ 16,500	$ 16,500	$ 16,500	$ 16,500	$ 16,500	$ 16,500
300385011300	Vacation, Personal	$ 11,064	$ 7,087	$ 8,374	$ 8,500	$ 8,500	$ 8,500	$ 8,500	$ 8,500	$ 8,500	$ 8,500
300385011400	Sick Pay	$ 1,119	$ 1,421	$ 1,699	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400	$ 1,400
300385011600	Duty Pay	$ 7,142	$ 6,846	$ 6,762	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000
300385012000	Longevity & Misc. Pay	$ 464	$ 1,523	$ 15,338	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500
300385015000	Social Security	$ 2,206	$ 2,202	$ 3,609	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500
300385015100	Pension	$ 2,734	$ 1,785	$ 3,389	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
300385121500	Advertising/Publishing Fees	$ 315	$ 850	$ 294	$ 350	$ 350	$ 350	$ 350	$ 350	$ 350	$ 350
300385122000	Phone	$ 270	$ 267	$ 314	$ 325	$ 325	$ 325	$ 325	$ 325	$ 325	$ 325
300385131000	Supplies	$ 1,039	$ 1,062	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500
300385138000	Data Processing	$ 1,867	$ 2,636	$ 2,416	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500
300385221000	Legal Fees	$ 235	$ 2,459	$ 105	$ 250	$ 250	$ 250	$ 250	$ 250	$ 250	$ 250
300385221200	Auditing Fees	$ 2,900	$ 3,000	$ 3,695	$ 3,800	$ 3,800	$ 3,800	$ 3,800	$ 3,800	$ 3,800	$ 3,800
300385221300	Lab Testing Fees	$ 901	$ 422	$ 2,969	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
300385221400	Outside Services Employed	$ -	$ 7,650	$ 2,699	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
300385351000	Property Insurance	$ 10,097	$ 9,418	$ 9,400	$ 9,400	$ 9,400	$ 9,400	$ 9,400	$ 9,400	$ 9,400	$ 9,400
300385639000	Misc. Admin./General Expense	$ 533	$ 197	$ 351	$ 355	$ 355	$ 355	$ 355	$ 355	$ 355	$ 355
300385639100	Office Rent	$ 2,000	$ 2,000	$ 2,000	$ 2,200	$ 2,200	$ 2,200	$ 2,200	$ 2,200	$ 2,200	$ 2,200
300385639300	Mayor/Council Contributions	$ 1,450	$ 1,250	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
300385639400	WWTP Environmental Fees	$ 3,470	$ 3,678	$ 3,578	$ 3,600	$ 3,600	$ 3,600	$ 3,600	$ 3,600	$ 3,600	$ 3,600
300385639500	WWTP Profiiency Testing	$ 900	$ 804	$ 1,380	$ 1,380	$ 1,380	$ 1,380	$ 1,380	$ 1,380	$ 1,380	$ 1,380
300385639600	Joint Meter Expense	$ 7,000	$ 7,409	$ 10,614	$ 10,614	$ 10,614	$ 10,614	$ 10,614	$ 10,614	$ 10,614	$ 10,614
	Total Admin/General Expenses	**$ 66,431**	**$ 74,166**	**$ 98,556**	**$ 85,174**	**$ 85,174**	**$ 85,174**	**$ 85,174**	**$ 85,174**	**$ 85,174**	**$ 85,174**
EMPLOYEE BENEFITS:											
300385413000	Health Insurance	$ 26,840	$ 19,457	$ 26,384.00	$ 35,000.00	$ 35,000.00	$ 35,000.00	$ 35,000.00	$ 35,000.00	$ 35,000.00	$ 35,000.00
300385415000	Social Security	$ 150	$ 209	$ 140.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00
300385415100	Pension	$ 235	$ 181	$ 132.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00
300385415200	Life Insurance	$ 449	$ 389	$ 377.00	$ 400.00	$ 400.00	$ 400.00	$ 400.00	$ 400.00	$ 400.00	$ 400.00
300385416000	Clothing/Safety Glasses	$ 497	$ 987	$ 456.00	$ 750.00	$ 750.00	$ 750.00	$ 750.00	$ 750.00	$ 750.00	$ 750.00
300385419000	Misc. Employee Benefits	$ -	$ 30	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
300385433600	Training Wages & Expense	$ 1,156	$ 3,749	$ 2,014.00	$ 3,500.00	$ 3,500.00	$ 3,500.00	$ 3,500.00	$ 3,500.00	$ 3,500.00	$ 3,500.00
300385433700	Safety Training	$ 2,266	$ 1,292	$ 2,226.00	$ 2,400.00	$ 2,400.00	$ 2,400.00	$ 2,400.00	$ 2,400.00	$ 2,400.00	$ 2,400.00
	Total Employee Benefits	**$ 31,593**	**$ 26,294**	**$ 31,729.00**	**$ 42,350.00**	**$ 42,350.00**	**$ 42,350.00**	**$ 42,350.00**	**$ 42,350.00**	**$ 42,350.00**	**$ 42,350.00**
	TOTAL EXPENSES	**$ 467,033**	**$ 478,155**	**$ 480,733**	**$ 490,318**	**$ 532,027**	**$ 549,987**	**$ 499,310**	**$ 511,578**	**$ 517,370**	**$ 527,587**
	TOTAL EXPENSES W/O Replacement	**$ 330,697**	**$ 339,423**	**$ 385,733**	**$ 385,318**	**$ 427,027**	**$ 444,987**	**$ 394,310**	**$ 406,578**	**$ 412,370**	**$ 422,587**
			Average (Start-up & Phase 1) =				$ 436,007		$ 400,444		$ 417,479

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10/1/2015

City of Fennimore
WWTP Facilities Planning
Replacement Fund Calculation **Alternative 1 - Phase 1**

Inflation Rate for Future Equipment Cost 0.00%
Interest Rate for Calculation 4.625%

	Description	Purchase Cost	Quantity	Equip Life	Inflated Cost	Annual Fund $	
5	**Influent Pumping**						
	Pumps	$22,500	4	20	$90,000	$2,831	$2,831
10	**Headworks/Grit Removal**						
	Mechanical screen	$90,000	1	20	$90,000	$2,831	
	Sampling equipment	$3,000	1	15	$3,000	$143	
	Grit removal equipment	$35,000	1	20	$35,000	$1,101	
	Grit pump	$30,000	1	20	$30,000	$944	
	Grit washer	$75,000	1	20	$75,000	$2,360	$7,379
15	**Equalization Tank**						
	Submersible pumps	$12,500	2	20	$25,000	$787	
	Blowers	$20,000	2	20	$40,000	$1,258	$2,045
20	**Primary Clarifiers**						
	Flow control valve	$5,000	1	15	$5,000	$238	
	Motorized valves	$1,500	4	15	$6,000	$286	
	Scraper assemblies	$30,000	2	20	$60,000	$1,888	
	Weirs and baffles	$15,000	2	20	$30,000	$944	$3,356
35	**RBCs**						
	Media and Shafts - Standard	$88,000	9	20	$792,000	$24,917	
	Media and Shafts - High	$135,000	3	20	$405,000	$12,742	
	Covers	$12,000	12	20	$144,000	$4,530	
	Baffles	$2,500	3	20	$7,500	$236	
	Diffusers	$15	4,680	20	$70,200	$2,209	
	Process Valves	$1,250	3	20	$3,750	$118	
	Weir Gates	$3,500	3	20	$10,500	$330	$45,082
45	**Chemical Feed**						
	Chemical feed pumps	$3,500	3	10	$10,500	$850	
	Chemical storage tanks	$2,500	2	20	$5,000	$157	
	Process valves	$175	3	20	$525	$17	$1,023
50	**Final Clarifiers**						
	Clarifier Mechanism	$95,000	2	20	$190,000	$5,978	
	Weirs and baffles	$22,500	2	20	$45,000	$1,416	$7,393
60	**Tertiary Filter**						
	Filter System	$220,000	2	20	$440,000	$13,843	
	Flash Mixer	$5,000	1	20	$5,000	$157	
	Floc Tank Mixer	$7,500	2	20	$15,000	$472	
	Polymer System	$12,000	1	20	$12,000	$378	
	Bypass valve or gates	$2,500	5	20	$12,500	$393	
	Sampling Equipment	$7,500	1	20	$7,500	$236	$15,479
70	**Anaerobic Digester**						
	Sludge recirculation pumps	$17,500	2	20	$35,000	$1,101	
	Primary sludge pumps	$22,500	2	20	$45,000	$1,416	
	Valves	$950	6	20	$5,700	$179	
	Digester mixing system	$75,000	1	20	$75,000	$2,360	
	Combination Boiler/Heat Exchanger	$150,000	1	20	$150,000	$4,719	

City of Fennimore
WWTP Facilities Planning
Replacement Fund Calculation **Alternative 1 - Phase 1**

Inflation Rate for Future Equipment Cost 0.00%
Interest Rate for Calculation 4.625%

Description	Purchase Cost	Quantity	Equip Life	Inflated Cost	Annual Fund $	
Gas Handling Equipment	$75,000	1	20	$75,000	$2,360	
Cover Rehabilitation	$75,000	1	20	$75,000	$2,360	$14,494
80 Sludge Storage Tank						
Mixer Pump Motor	$3,500	1	20	$3,500	$110	$110
85 Waste Receiving Station						
Air Diffusers	$200	8	20	$1,600	$50	
Blower	$5,000	1	20	$5,000	$157	
Submersible pumps	$7,500	2	20	$15,000	$472	
Bar Screen	$14,000	1	20	$14,000	$440	
Gates	$3,750	2	20	$7,500	$236	$1,356
90 Lab/Process Building						
Laboratory equipment	$20,000	1	20	$20,000	$629	
Generator	$50,000	1	20	$50,000	$1,573	$2,202
Allowance Equipment						
Vehicles/Vac Truck	$200,000	1	15	$200,000	$9,533	
Safety Equipment	$25,000	1	15	$25,000	$1,192	$10,725
Electrical Equipment						
MCCs and control panels	$200,000	1	20	$200,000	$6,292	
Instrumentation	$75,000	1	10	$75,000	$6,068	$12,360
Subtotal					$125,836	$125,836
Equipment Installation	15%				$18,875	
Total Annual Replacement Fund					**$144,712**	

City of Fennimore
WWTP Facilities Planning
Replacement Fund Calculation **Alternative 2 - Phase 1**

Inflation Rate for Future Equipment Cost	0.00%
Interest Rate for Calculation	4.625%

	Description	Purchase Cost	Quantity	Equip Life	Inflated Cost	Annual Fund $	
5	**Influent Pumping**						
	Pumps	$22,500	4	20	$90,000	$2,831	$2,831
10	**Headworks/Grit Removal**						
	Mechanical screen	$90,000	1	20	$90,000	$2,831	
	Sampling equipment	$3,000	1	15	$3,000	$143	
	Grit removal equipment	$35,000	1	20	$35,000	$1,101	
	Grit pump	$30,000	1	20	$30,000	$944	
	Grit washer	$75,000	1	20	$75,000	$2,360	$7,379
15	**Equalization Tank**						
	Submersible pumps	$12,500	2	20	$25,000	$787	
	Blowers	$20,000	2	20	$40,000	$1,258	$2,045
20	**Primary Clarifiers**						
	Flow control valve	$5,000	1	15	$5,000	$238	
	Motorized valves	$1,500	4	15	$6,000	$286	
	Scraper assemblies	$30,000	2	20	$60,000	$1,888	
	Weirs and baffles	$15,000	2	20	$30,000	$944	$3,356
30	**Splitter/Selector Basins**						
	Mixers	$7,500	4	20	$30,000	$944	
	Recycle pump	$5,000	1	20	$5,000	$157	
	Valves	$1,250	12	20	$15,000	$472	
	Weir Gates	$3,500	8	20	$28,000	$881	$2,454
35	**Aeration Basins**						
	Process Valves	$1,250	3	20	$3,750	$118	
	Weir Gates	$3,500	3	20	$10,500	$330	
	Automated aeration valves	$1,500	4	15	$6,000	$286	
	Aeration grids	$25	1,856	20	$46,400	$1,460	$2,194
40	**Process Building/Blowers**						
	Aeration Blowers	$25,000	3	20	$75,000	$2,360	
	RAS/WAS Pumps and VFDs	$17,500	4	20	$70,000	$2,202	
	Air - Motorized valves	$3,500	3	15	$10,500	$500	
	Air - Manual Valves	$650	10	20	$6,500	$204	
	Process Valves	$3,500	20	20	$70,000	$2,202	$7,469
45	**Chemical Feed**						
	Chemical feed pumps	$3,500	3	10	$10,500	$850	
	Chemical storage tanks	$2,500	2	20	$5,000	$157	
	Process valves	$175	3	20	$525	$17	$1,023
50	**Final Clarifiers**						
	Clarifier Mechanism	$95,000	3	20	$285,000	$8,966	
	Weirs and baffles	$22,500	3	20	$67,500	$2,124	$11,090
70	**Anaerobic Digester**						
	Sludge recirculation pumps	$17,500	2	20	$35,000	$1,101	
	Primary sludge pumps	$22,500	2	20	$45,000	$1,416	
	Valves	$950	6	20	$5,700	$179	

City of Fennimore
WWTP Facilities Planning
Replacement Fund Calculation **Alternative 2 - Phase 1**

Inflation Rate for Future Equipment Cost 0.00%
Interest Rate for Calculation 4.625%

Description	Purchase Cost	Quantity	Equip Life	Inflated Cost	Annual Fund $	
Digester mixing system	$75,000	1	20	$75,000	$2,360	
Combination Boiler/Heat Exchanger	$150,000	1	20	$150,000	$4,719	
Gas Handling Equipment	$75,000	1	20	$75,000	$2,360	
Cover Rehabilitation	$75,000	1	20	$75,000	$2,360	$14,494
80 Sludge Storage Tank						
Mixer Pump Motor	$3,500	1	20	$3,500	$110	$110
85 Waste Receiving Station						
Air Diffusers	$200	8	20	$1,600	$50	
Blower	$5,000	1	20	$5,000	$157	
Submersible pumps	$7,500	2	20	$15,000	$472	
Bar Screen	$14,000	1	20	$14,000	$440	
Gates	$3,750	2	20	$7,500	$236	$1,356
90 Lab/Process Building						
Laboratory equipment	$20,000	1	20	$20,000	$629	
Generator	$50,000	1	20	$50,000	$1,573	$2,202
Allowance Equipment						
Vehicles/Vac Truck	$200,000	1	15	$200,000	$9,533	
Safety Equipment	$25,000	1	15	$25,000	$1,192	$10,725
Electrical Equipment						
MCCs and control panels	$200,000	1	20	$200,000	$6,292	
Instrumentation	$75,000	1	10	$75,000	$6,068	$12,360
Subtotal					$81,089	$81,089
Equipment Installation	15%				$12,163	
Total Annual Replacement Fund					**$93,253**	

City of Fennimore
WWTP Facilities Planning
Replacement Fund Calculation **Alternative 3 - Phase 1**

Inflation Rate for Future Equipment Cost 0.00%
Interest Rate for Calculation 4.625%

	Description	Purchase Cost	Quantity	Equip Life	Inflated Cost	Annual Fund $	
5	**Influent Pumping**						
	Pumps	$22,500	4	20	$90,000	$2,831	$2,831
10	**Headworks/Grit Removal**						
	Mechanical screen	$90,000	1	20	$90,000	$2,831	
	Sampling equipment	$3,000	1	15	$3,000	$143	
	Grit removal equipment	$35,000	1	20	$35,000	$1,101	
	Grit pump	$30,000	1	20	$30,000	$944	
	Grit washer	$75,000	1	20	$75,000	$2,360	$7,379
15	**Equalization Tank**						
	Submersible pumps	$12,500	2	20	$25,000	$787	
	Blowers	$20,000	2	20	$40,000	$1,258	$2,045
30	**Splitter/Selector Basins**						
	Mixers	$7,500	4	20	$30,000	$944	
	Recycle pump	$5,000	1	20	$5,000	$157	
	Valves	$1,250	12	20	$15,000	$472	
	Weir Gates	$3,500	8	20	$28,000	$881	$2,454
35	**Aeration Basins**						
	Process Valves	$1,250	3	20	$3,750	$118	
	Weir Gates	$3,500	3	20	$10,500	$330	
	Automated aeration valves	$1,500	4	15	$6,000	$286	
	Aeration grids	$25	1,856	20	$46,400	$1,460	$2,194
40	**Process Building/Blowers**						
	Aeration Blowers	$25,000	3	20	$75,000	$2,360	
	RAS/WAS Pumps and VFDs	$17,500	4	20	$70,000	$2,202	
	Air - Motorized valves	$3,500	3	15	$10,500	$500	
	Air - Manual Valves	$650	10	20	$6,500	$204	
	Process Valves	$3,500	20	20	$70,000	$2,202	$7,469
45	**Chemical Feed**						
	Chemical feed pumps	$3,500	3	10	$10,500	$850	
	Chemical storage tanks	$2,500	2	20	$5,000	$157	
	Process valves	$175	3	20	$525	$17	$1,023
50	**Final Clarifiers**						
	Clarifier Mechanism	$95,000	3	20	$285,000	$8,966	
	Weirs and baffles	$22,500	3	20	$67,500	$2,124	$11,090
70	**Aerobic Digester**						
	Sludge pumps	$17,500	2	20	$35,000	$1,101	
	Blowers	$30,000	2	20	$60,000	$1,888	
	Diffusers	$30	1,590	20	$47,700	$1,501	
	Cover	$75,000	1	20	$75,000	$2,360	
	Valves	$950	15	20	$14,250	$448	$7,297
80	**Sludge Storage Tank**						
	Mixer Pump Motor	$3,500	1	20	$3,500	$110	$110

City of Fennimore
WWTP Facilities Planning
Replacement Fund Calculation **Alternative 3 - Phase 1**

Inflation Rate for Future Equipment Cost	0.00%
Interest Rate for Calculation	4.625%

Description	Purchase Cost	Quantity	Equip Life	Inflated Cost	Annual Fund $	
85 Waste Receiving Station						
Air Diffusers	$200	8	20	$1,600	$50	
Blower	$5,000	1	20	$5,000	$157	
Submersible pumps	$7,500	2	20	$15,000	$472	
Bar Screen	$14,000	1	20	$14,000	$440	
Gates	$3,750	2	20	$7,500	$236	$1,356
90 Lab/Process Building						
Laboratory equipment	$20,000	1	20	$20,000	$629	
Generator	$50,000	1	20	$50,000	$1,573	$2,202
Allowance Equipment						
Vehicles/Vac Truck	$200,000	1	15	$200,000	$9,533	
Safety Equipment	$25,000	1	15	$25,000	$1,192	$10,725
Electrical Equipment						
MCCs and control panels	$200,000	1	20	$200,000	$6,292	
Instrumentation	$75,000	1	10	$75,000	$6,068	$12,360
Subtotal					$70,537	$70,537
Equipment Installation	15%				$10,581	
Total Annual Replacement Fund					**$81,117**	

City of Fennimore WWTP Upgrade
Present Worth Values of Alternatives

Current Discount Rate	4.625%
Number of Years	20

No.	Capital Cost	Average Annual O&M	Annual Replacement	Present Worth
WWTP Alternatives				
1	$9,352,836	$436,007	$144,712	$16,825,700
2	$9,068,323	$400,444	$93,253	$15,421,400
3	$8,465,427	$417,479	$81,117	$14,881,500

Average O&M costs are the average between Startup and Phase 1 O&M costs

% Difference
-11.6%

City of Fennimore
WWTP Facilities Planning
Chemical Usage 2013 - 2014

2013	Days	Alum Gallons	Alum Cost
January	31		
February	28		
March	31		
April	30	1,245	$2,563
May	31		
June	30	1,750	$3,575
July	31	990	$2,000
August	31	1,300	$2,646
September	30		
October	31	1,320	$2,686
November	30		
December	31	1,090	$2,222
Total	365	7,695	$15,693
Monthly Average		1,283	$2,615
Daily Average		21	$43

Alum Cost/Gallon = $2.04

2014	Days	Alum Gallons	Alum Cost
January	31		
February	28		
March	31	930	$1,879
April	30	2,380	$4,856
May	31		
June	30		
July	31	1,555	$3,141
August	31	1,265	$2,603
September	30		
October	31	2,007	$4,226
November	30		
December	31	1,320	$2,713
Total	365	9,457	$19,417
Monthly Average		1,576	$3,236
Daily Average		26	$53

Alum Cost/Gallon = $2.05

City of Fennimore
WWTP Facilities Planning
WWTP Utilities 2012 - 2014

2012	Days	Power KWH	Power Cost	PCAC Cost	Demand KW	Demand Cost	Water gallons	Water Cost	LP Fuel Gallons	LP Fuel Cost	Fire & Public	Utilities Total w/o LP	Utilities Total
Total	365	355,400	$19,810		878	$5,268	1,639,700	$5,567	5,343	$8,788	$1,780	$32,425	$41,213

Total Power Cost = $25,078 | per KWH = $0.071 | per gal = $0.003 | per gal = $1.64

2013	Days	Power KWH	Power Cost	PCAC Cost	Demand KW	Demand Cost	Water gallons	Water Cost	LP Fuel Gallons	LP Fuel Cost	Fire & Public	Utilities Total w/o LP	Utilities Total
January	31	33,800	$1,805	$34	76	$456	60,500	$271			$148	$2,714	$2,714
February	28	30,000	$1,604	$45	72	$432	51,300	$236			$148	$2,465	$2,465
March	31	31,400	$1,678	$141	76	$456	66,600	$294			$148	$2,718	$2,718
April	30	28,800	$1,541	$191	76	$456	44,100	$208	611	$977	$148	$2,544	$3,520
May	31	30,000	$1,604	$207	68	$408	51,300	$236	1,050	$1,689	$148	$2,603	$4,292
June	30	31,400	$1,678	$210	68	$408	77,542	$322	626	$1,006	$148	$2,766	$3,772
July	31	39,800	$2,121	$151	70	$420	251,658	$757			$148	$3,598	$3,598
August	31	21,000	$1,129	$143	64	$384	307,444	$897			$148	$2,700	$2,700
September	30	25,400	$1,361	$173	70	$420	142,656	$485	7,471	$10,249	$148	$2,587	$12,835
October	31	25,800	$1,382	$15	58	$348	156,700	$520			$148	$2,414	$2,414
November	30	30,600	$1,636	$18	82	$492	61,400	$274			$148	$2,569	$2,569
December	31	29,600	$1,583	$18	92	$552	60,300	$270			$148	$2,571	$2,571
Total	365	357,600	$19,121	$1,347	872	$5,232	1,331,500	$4,768	9,758	$13,920	$1,780	$32,248	$46,168
Monthly Average		29,800	$1,593	$112	73	$436	110,958	$397	2,439	$3,480	$148.34	$2,687	$3,847.36
Daily Average		980	$52	$4	2	$14	3,648	$13	27	$38	$5	$88	$126

Total Power Cost = $25,700 | per KWH = $0.072 | per gal = $0.004 | per gal = $1.43

2014	Days	Power KWH	Power Cost	PCAC Cost	Demand KW	Demand Cost	Water gallons	Water Cost	LP Fuel Gallons	LP Fuel Cost	Fire & Public	Utilities Total w/o LP	Utilities Total
January	31	45,200	$2,407	$226	92	$552	79,214	$326			$148	$3,659	$3,659
February	28	19,800	$1,065	$48	72	$432	34,886	$172			$148	$1,866	$1,866
March	31	45,200	$2,407	$375	72	$432	82,500	$334	132	$256	$148	$3,696	$3,952
April	30	29,800	$1,593	$340	88	$528	37,600	$183	1,151	$2,310	$148	$2,792	$5,102
May	31	19,600	$1,065	$210	108	$654	71,900	$311	539	$1,002	$148	$2,389	$3,391
June	30	25,200	$1,351	$242	58	$348	74,200	$313	9,327	$15,182	$148	$2,402	$17,584
July	31	30,000	$1,604	$285	84	$504	178,700	$575	455	$727	$148	$3,116	$3,843
August	31	38,200	$2,037	$329	80	$480	77,800	$322			$148	$3,316	$3,316
September	30	31,400	$1,678	$217	72	$432	61,600	$275			$148	$2,750	$2,750
October	31	52,800	$2,808	$533	94	$564	91,700	$357			$148	$4,411	$4,411
November	30	16,200	$875	$264	74	$444	27,300	$143			$148	$1,875	$1,875
December	31	40,400	$2,153	$396	100	$600	67,380	$296	2,000	$3,198	$148	$3,594	$6,792
Total	365	393,800	$21,043	$3,464	994	$5,970	884,780	$3,608	13,604	$22,675	$1,780	$35,866	$58,541
Monthly Average		32,817	$1,754	$289	83	$498	73,732	$301	2,267	$3,779	$148.34	$2,989	$4,878.41
Daily Average		1,079	$58	$9	3	$16	2,424	$10	37	$62	$5	$98	$160

Total Power Cost = $30,477 | per KWH = $0.077 | per gal = $0.004 | per gal = $1.67

Power Cost Adjustment (PCAC): positive or negative power cost adjustment charge equivalent to the amount by which the current cost of power is greater or lesser than the base cost of power purchased or produced. The base cost until charged by the PSC is $0.0508 per kWh

LP fuel costs do not include patronage credits: $361 in 2014, $155 in 2013

City of Fennimore
WWTP Facilities Planning
Estimated Building Sizes

Current Buildings	W (ft)	L (ft)	Area (SF)	Phase 1 Alt 1 Area (SF)	Phase 1 Alt 2 Area (SF)	Phase 1 Alt 3 Area (SF)	Phase 3 Area (SF)
Control Building - Main	51	42	2,142	2,142	2,142	2,142	
Control Building - Filter	19	42	798	798	798	798	
Control Building - Pumps	12	18	216	216	216	216	
Control Building - Sceen	10	18	180	180	180	180	
Primary - Flume	10	11	110	110	110	0	
EQ Tank Blowers	14	15	210	210	210	210	
Chemical Feed	17	19	323	323	323	323	
RBC Blowers	15	15	225	225			
Digester - Main	16	20	320	320	320	320	
Digester - Lower Level	16	20	320	320	320	320	
Garage - Existing	36	48	1,728	1,728	1,728	1,728	
Electric Heat			**758**				
LP Heat			**3,976**				
Unheated			**1,838**				
Lighting			**6,572**				

Future Buildings	W (ft)	L (ft)	Area (SF)	Alt 1 Area (SF)	Alt 2 Area (SF)	Alt 3 Area (SF)	Phase 3 Area (SF)
Headworks	42	50	2,100	2,100	2,100	2,100	
Process Control (RAS/WAS/Blowers)	40	60	2,400		2,400	2,400	
Digester Gas Handling Room	10	16	160	160	160	160	
Solids Handling/Thickening	22	43	946				946
Electric Heat				**2,968**	**5,143**	**5,033**	**946**
LP Heat				**4,136**	**4,136**	**4,136**	
Garage Heat				**1,728**	**1,728**	**1,728**	
Lighting (all buildings)				**8,832**	**11,007**	**10,897**	**946**

Current unheated spaces are the Garage and Primary Building
Electric Heat includes Blower Buildings and Chemical Feed (Current) plus Headworks, Primary Building, and Process Control (Future)
LP Heat includes Control Building, Digester (Current)

City of Fennimore
WWTP Facilities Planning
Estimated Electrical Use - Alternative 1

Utility Rate per kWH $0.077 per kWH

Description	BHP				Total kW				Hrs/d				Annual kWH			
	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3
Headworks																
Mechanical screen	2	3	3	3	1.50	2.25	2.25	2.25	6	7	10	10	3,285	5,749	8,213	8,213
Air Blowers																
RBCs	15	27	27	27	11.25	20.25	20.25	20.25	24	24	24	24	98,550	177,390	177,390	177,390
Activated Sludge	0	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0
Equalization Tank	20	20	20	20	15.00	15.00	15.00	15.00	12	12	12	12	65,700	65,700	65,700	65,700
Filter Scour	10	10	10	10	7.50	7.50	7.50	7.50	1	1	1	1	2,738	2,738	2,738	2,738
RBC Drives		48	48	64	0.00	36.00	36.00	48.00	0	24	24	24	0	315,360	315,360	420,480
Pumping																
Influent	13	14	14	14	9.75	10.50	10.50	10.50	24	24	24	24	85,410	91,980	91,980	91,980
EQ Tank Mixing	2.7	2.7	2.7	2.7	2.03	2.03	2.03	2.03	12	12	12	12	8,870	8,870	8,870	8,870
Primary sludge	2.7	2.7	2.7	2.7	2.03	2.03	2.03	2.03	1.5	2	3	3	1,109	1,478	2,217	2,217
RAS/WAS					0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0
Recycle					0.00	0.00	0.00	0.00	24	24	24	24	0	0	0	0
TWAS				15	0.00	0.00	0.00	11.25	0	0	0	3	0	0	0	12,319
Digester Sludge Recirc	2	6	6	6	1.50	4.50	4.50	4.50	12	12	12	12	6,570	19,710	19,710	19,710
Storage tank	55	55	55	55	41.25	41.25	41.25	41.25	0.1	0.1	0.2	0.3	1,506	1,506	3,011	4,517
Decant Pump	0.5	1	1	1	0.38	0.75	0.75	0.75	8	8	8	8	1,095	2,190	2,190	2,190
Filter Backwash	7	7	7	7	5.25	5.25	5.25	5.25	1	1	1	1	1,916	1,916	1,916	1,916
Waste receiving		3	3	3	0.00	2.25	2.25	2.25	0	8	8	8	0	6,570	6,570	6,570
Filter Equipment		5	5	5	0.00	3.75	3.75	3.75	1	2	3	3	0	2,738	4,106	4,106
Sludge Processing																
WAS thickening				5	0.00	0.00	0.00	3.75	0	0	0	24	0	0	0	32,850
Air compressors				10	0.00	0.00	0.00	7.50	0	0	0	12	0	0	0	32,850
Mixing																
Selectors					0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0
Digester	5	10	10	10	3.75	7.50	7.50	7.50	12	12	12	24	16,425	32,850	32,850	65,700
Filter - Flocculation		2	2	2	0.00	1.50	1.50	1.50	0	24	24	24	0	13,140	13,140	13,140
Clarification																
Primary scrapers	2	2	2	2	1.50	1.50	1.50	1.50	24	24	24	24	13,140	13,140	13,140	13,140
Finals scrapers	0.7	0.7	0.7	1.1	0.53	0.53	0.53	0.83	24	24	24	24	4,599	4,599	4,599	7,227
General	W/sf	W/sf	W/sf	W/sf	sf	sf	sf	sf								
Lighting	1.25	1.25	1.25	1.25	6,572	8,832	8,832	9,778	10	10	10	10	29,985	40,296	40,296	44,612
Heating	10	10	10	10	758	2,968	2,968	3,914	4	4	4	4	11,067	43,333	43,333	57,144
Miscellaneous kW					5.00	5.00	5.00	5.00	24	24	24	24	43,800	43,800	43,800	43,800
Total Energy (kWH)													395,763	895,051	901,128	1,139,379
Total Energy Electrical Cost													**$30,474**	**$68,919**	**$69,387**	**$87,732**
2014 Energy Electrical Cost													$30,477			
Increase from 2014														$38,442	$38,910	$57,255

Electrical heating for chemical feed bldg, blower bldgs
Future electric heated buildings: headworks, process bldg, primary flume
Digester/digester building and control building heated with propane/biogas

Electric Heating Costs			
Current	Start Up	Phase 1	Phase 3
$852	$3,337	$3,337	$4,400

Elect Costs for RBC Drives and Blowers			
Current	Start Up	Phase 1	Phase 3
$7,588	$37,942	$37,942	$46,036

City of Fennimore
WWTP Facilities Planning
Estimated Electrical Use - Alternative 2

Utility Rate per kWH $0.077 per kWH

Description	BHP				Total kW				Hrs/d				Annual kWH			
	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3
Headworks																
Mechanical screen	2	3	3	3	1.50	2.25	2.25	2.25	6	7	10	10	3,285	5,749	8,213	8,213
Air Blowers																
RBCs	15				11.25	0.00	0.00	0.00	24	24	24	24	98,550	0	0	0
Activated Sludge	0	20	30	40	0.00	15.00	22.50	30.00	0	24	24	24	0	131,400	197,100	262,800
Equalization Tank	20	20	20	20	15.00	15.00	15.00	15.00	12	12	12	12	65,700	65,700	65,700	65,700
Aerobic Digester					0.00	0.00	0.00	0.00					0	0	0	0
Filter Scour	10				7.50	0.00	0.00	0.00	1				2,738	0	0	0
RBC Drives					0.00	0.00	0.00	0.00					0	0	0	0
Pumping																
Influent	13	14	14	14	9.75	10.50	10.50	10.50	24	24	24	24	85,410	91,980	91,980	91,980
EQ Tank Mixing	2.7	2.7	2.7	2.7	2.03	2.03	2.03	2.03	12	12	12	12	8,870	8,870	8,870	8,870
Primary sludge	2.7	2.7	2.7	2.7	2.03	2.03	2.03	2.03	1.5	2	3	3	1,109	1,478	2,217	2,217
RAS/WAS		2.5	4.5	4.5	0.00	1.88	3.38	3.38	0	24	24	24	0	16,425	29,565	29,565
Recycle		3	3	3	0.00	2.25	2.25	2.25	24	24	24	24	0	19,710	19,710	19,710
TWAS				15	0.00	0.00	0.00	11.25	0	0	0	3	0	0	0	12,319
Digester Sludge Recirc	2	3	3	3	1.50	2.25	2.25	2.25	12	12	12	12	6,570	9,855	9,855	9,855
Storage tank	55	55	55	55	41.25	41.25	41.25	41.25	0.1	0.1	0.2	0.3	1,506	1,506	3,011	4,517
Decant Pump	0.5	1	1	1	0.38	0.75	0.75	0.75	8	8	8	8	1,095	2,190	2,190	2,190
Filter Backwash	7				5.25	0.00	0.00	0.00	1				1,916	0	0	0
Waste receiving		3	3	3	0.00	2.25	2.25	2.25	0	8	8	8	0	6,570	6,570	6,570
Filter Equipment					0.00	0.00	0.00	0.00					0	0	0	0
Sludge Processing																
WAS thickening				5	0.00	0.00	0.00	3.75	0	0	0	24	0	0	0	32,850
Air compressors				10	0.00	0.00	0.00	7.50	0	0	0	12	0	0	0	32,850
Mixing																
Selectors		7.5	10	10	0.00	5.63	7.50	7.50	0	12	12	12	0	24,638	32,850	32,850
Digester	5	10	10	10	3.75	7.50	7.50	7.50	12	12	12	12	16,425	32,850	32,850	32,850
Filter - Flocculation					0.00	0.00	0.00	0.00					0	0	0	0
Clarification																
Primary scrapers	2	2	2	2	1.50	1.50	1.50	1.50	24	24	24	24	13,140	13,140	13,140	13,140
Finals scrapers	0.7	0.7	1.1	1.1	0.53	0.53	0.83	0.83	24	24	24	24	4,599	4,599	7,227	7,227
General	W/sf	W/sf	W/sf	W/sf	sf	sf	sf	sf								
Lighting	1.25	1.25	1.25	1.25	6,572	10,897	10,897	11,843	10	10	10	10	29,985	49,718	49,718	54,034
Heating	10	10	10	10	758	5,143	5,143	6,089	4	4	4	4	11,067	75,088	75,088	88,899
Miscellaneous kW					5.00	5.00	5.00	5.00	24	24	24	24	43,800	43,800	43,800	43,800
Total Energy (kWH)													395,763	605,264	699,653	863,005
Total Energy Electrical Cost													**$30,474**	**$46,605**	**$53,873**	**$66,451**
2014 Energy Electrical Cost													$30,477			
Increase from 2014														$16,128	$23,396	$35,974

Electrical heating for chemical feed bldg, blower bldgs
Future electric heated buildings: headworks, process bldg, primary flume
Digester/digester building and control building heated with propane/biogas

Electric Heating Costs			
Current	Start Up	Phase 1	Phase 3
$852	$5,782	$5,782	$6,845

Elect Costs for AS Blowers and Selectors			
Current	Start Up	Phase 1	Phase 3
$0	$12,015	$17,706	$22,765

Elect Costs for RAS, WAS, Recycle Pumping			
Current	Start Up	Phase 1	Phase 3
$0	$2,782	$3,794	$3,794

City of Fennimore
WWTP Facilities Planning
Estimated Electrical Use - Alternative 3

Utility Rate per kWH $0.077 per kWH

Description	BHP				Total kW				Hrs/d				Annual kWH			
	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3	Current	Start Up	Phase 1	Phase 3
Headworks																
Mechanical screen	2	3	3	3	1.50	2.25	2.25	2.25	6	7	10	10	3,285	5,749	8,213	8,213
Air Blowers																
RBCs	15				11.25	0.00	0.00	0.00	24	24	24	24	98,550	0	0	0
Activated Sludge	0	30	40	50	0.00	22.50	30.00	37.50	0	24	24	24	0	197,100	262,800	328,500
Equalization Tank	20	20	20	20	15.00	15.00	15.00	15.00	12	12	12	12	65,700	65,700	65,700	65,700
Aerobic Digester		50	50	50	0.00	37.50	37.50	37.50	0	24	24	24	0	328,500	328,500	328,500
Filter Scour	10				7.50	0.00	0.00	0.00	1				2,738	0	0	0
RBC Drives					0.00	0.00	0.00	0.00	0				0	0	0	0
Pumping																
Influent	13	14	14	14	9.75	10.50	10.50	10.50	24	24	24	24	85,410	91,980	91,980	91,980
EQ Tank Mixing	2.7	2.7	2.7	2.7	2.03	2.03	2.03	2.03	12	12	12	12	8,870	8,870	8,870	8,870
Primary sludge	2.7				2.03	0.00	0.00	0.00	1.5				1,109	0	0	0
RAS/WAS		2	5	5	0.00	1.50	3.75	3.75	0	24	24	24	0	13,140	32,850	32,850
Recycle		3	3	3	0.00	2.25	2.25	2.25	24	24	24	24	0	19,710	19,710	19,710
TWAS				15	0.00	0.00	0.00	11.25	0	0	0	3	0	0	0	12,319
Digester Sludge Recirc	2				1.50	0.00	0.00	0.00	12				6,570	0	0	0
Storage tank	55	55	55	55	41.25	41.25	41.25	41.25	0.1	0.1	0.2	0.3	1,506	1,506	3,011	4,517
Decant Pump	0.5	1	1	1	0.38	0.75	0.75	0.75	8	8	8	8	1,095	2,190	2,190	2,190
Filter Backwash	7				5.25	0.00	0.00	0.00	1				1,916	0	0	0
Waste receiving		3	3	3	0.00	2.25	2.25	2.25	0	8	8	8	0	6,570	6,570	6,570
Filter Equipment					0.00	0.00	0.00	0.00	1	24	24	24	0	0	0	0
Sludge Processing																
WAS thickening				5	0.00	0.00	0.00	3.75	0	0	0	24	0	0	0	32,850
Air compressors				10	0.00	0.00	0.00	7.50	0	0	0	12	0	0	0	32,850
Mixing																
Selectors		7.5	10	10	0.00	5.63	7.50	7.50	0	12	12	12	0	24,638	32,850	32,850
Digester	5				3.75	0.00	0.00	0.00	12	12	12	24	16,425	0	0	0
Filter - Flocculation					0.00	0.00	0.00	0.00	0	24	24	24	0	0	0	0
Clarification																
Primary scrapers	2				1.50	0.00	0.00	0.00	24	24	24	24	13,140	0	0	0
Finals scrapers	0.7	0.7	1.1	1.1	0.53	0.53	0.83	0.83	24	24	24	24	4,599	4,599	7,227	7,227
General	W/sf	W/sf	W/sf	W/sf	sf	sf	sf	sf								
Lighting	1.25	1.25	1.25	1.25	6,572	10,897	10,897	11,843	10	10	10	10	29,985	49,718	49,718	54,034
Heating	10	10	10	10	758	5,033	5,033	5,979	4	4	4	4	11,067	73,482	73,482	87,293
Miscellaneous kW					5.00	5.00	5.00	5.00	24	24	24	24	43,800	43,800	43,800	43,800
Total Energy (kWH)													395,763	937,250	1,037,470	1,200,822
Total Energy Electrical Cost													**$30,474**	**$72,168**	**$79,885**	**$92,463**
2014 Energy Electrical Cost													$30,477			
Increase from 2014														$41,691	$49,408	$61,986

Electrical heating for chemical feed bldg, blower bldgs
Future electric heated buildings: headworks, process bldg
Digester building and control building heated with propane/biogas

Electric Heating Costs			
Current	Start Up	Phase 1	Phase 3
$852	$5,658	$5,658	$6,722

Elect Costs for AS Blowers and Selectors			
Current	Start Up	Phase 1	Phase 3
$0	$17,074	$22,765	$27,824

Elect Costs for Digester			
Current	Start Up	Phase 1	Phase 3
$1,265	$25,295	$25,295	$25,295

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10/1/2015

Appendix N

Design Data and Models for Alternatives

City of Fennimore
WWTP Facility Plan

WWTP Loadings - Based on Current and Future Loading Projections

		Current (Sustained)				Design - Total			Max Day	Peak Hr		Design - Phase 1			Max Day	Peak Hr
Flow	mgd	0.330			mgd	0.608			1.006	2.213	mgd	0.620			1.006	2.213
BOD	mg/L		ppd	693	mg/L		ppd	878			mg/L		ppd	878		
SS	mg/L		ppd	502	mg/L		ppd	680			mg/L		ppd	680		
VSS	%	75%	ppd	377	%	75%	ppd	510			%	75%	ppd	510		
TKN	mg/L		ppd	101	mg/L		ppd	91			mg/L		ppd	91		
Phos	mg/L		ppd	18	mg/L		ppd	16			mg/L		ppd	16		

Holding Tank

Flow	mgd	0.000			mgd	0.005			mgd	0.000		
BOD	mg/L	1,500	ppd	0	mg/L	1,500	ppd	63	mg/L	1,500	ppd	0
SS	mg/L	1,000	ppd	0	mg/L	1,000	ppd	42	mg/L	1,000	ppd	0
VSS	%	75%	ppd	0	%	75%	ppd	31	%	75%	ppd	0
TKN	mg/L	200	ppd	0	mg/L	200	ppd	8	mg/L	200	ppd	0
Phos	mg/L	17	ppd	0	mg/L	17	ppd	1	mg/L	17	ppd	0

Septage

Flow	mgd	0.000			mgd	0.008			mgd	0.000		
BOD	mg/L	7,500	ppd	0	mg/L	7,500	ppd	469	mg/L	7,500	ppd	0
SS	mg/L	10,000	ppd	0	mg/L	10,000	ppd	626	mg/L	10,000	ppd	0
VSS	%	75%	ppd	0	%	75%	ppd	469	%	75%	ppd	0
TKN	mg/L	400	ppd	0	mg/L	400	ppd	25	mg/L	400	ppd	0
Phos	mg/L	250	ppd	0	mg/L	250	ppd	16	mg/L	250	ppd	0

Total

Flow	mgd	0.330			mgd	0.620			mgd	0.620		
BOD	mg/L	252	ppd	693	mg/L	273	ppd	1,410	mg/L	170	ppd	878
SS	mg/L	182	ppd	502	mg/L	261	ppd	1,347	mg/L	132	ppd	680
VSS	%	137	ppd	377	%	195	ppd	1,010	%	99	ppd	510
TKN	mg/L	36.7	ppd	101	mg/L	24	ppd	125	mg/L	18	ppd	91
Phos	mg/L	6.4	ppd	18	mg/L	6	ppd	32	mg/L	3	ppd	16

City of Fennimore WWTP Design Model - RBCs

Influent Loadings		**Current - Sustained**		Recycle	**Design - Phase 1**		Recycle	**Design - Total**		Recycle
Flow	mgd	0.330	229		0.608	422		0.608	422	
Recycle	gpd	17,940	12	17,992	24,227	17	24,219	50,407	35	50,408
BOD	lbs/day	693	252		878	173		878	173	
Recycle	lbs/day	15.9	106	15.9	30.9	153	30.9	85.1	202	85.1
TS	lbs/day	502	182		680	134		680	134	
Recycle	lbs/day	844	5,641	847	1,117	5,528	1,116	2,253	5,359	2,254
VSS	lbs/day	377	137		510	101		510	101	
Recycle	lbs/day	635	4,244	635	837	4,142	837	1,690	4,020	1,690
TKN	lbs/day	101	37		91	18		91	18	
Recycle	lbs/day	7.4	49	7.4	14.8	73	14.8	41.2	98	41.2
Total Phosphorus	lbs/day	18	6		16	3		16	3	
Recycle	lbs/day	20	135	20.1	21	103	20.6	66	156	65.5
Holding Tank										
Flow	mgd	0.000			0.000			0.005		
BOD	lbs/day	0			0			63		
TS	lbs/day	0			0			42		
VSS	lbs/day	0			0			31		
TKN	lbs/day	0			0			8		
Total Phosphorus	lbs/day	0			0			1		
Waste to Headworks or Digester	H or D	D			H			H		
Septage										
Flow	mgd	0.000			0.000			0.008		
BOD	lbs/day	0			0			469		
TS	lbs/day	0			0			626		
VSS	lbs/day	0			0			469		
TKN	lbs/day	0			0			25		
Total Phosphorus	lbs/day	0			0			16		
Waste to Headworks or Digester	H or D	D			H			H		

Primary Clarifiers

Influent										
Flow	MGD	0.348	242	gpm	0.632	439	gpm	0.670	466	gpm
BOD	lbs/day	709	244	mg/L	909	173	mg/L	1495	267	mg/L
TSS	lbs/day	1346	464	mg/L	1797	341	mg/L	3600	644	mg/L
VSS	lbs/day	1012	349	mg/L	1347	256	mg/L	2700	483	mg/L
TKN	lbs/day	108	37	mg/L	106	20	mg/L	166	30	mg/L
Total Phosphorus - Influent	lbs/day	18	6	mg/L	16	3	mg/L	32	6	mg/L
Total Phosphorus - Recycle	lbs/day	20	7	mg/L	21	4	mg/L	66	12	mg/L
No. of Clarifiers in Use		2			2			2		
Tank Dimensions										
Length	ft	35			35			35		
Width	ft	11			11			11		
SWD	ft	7			7			7		
Surface Area	sf	385			385			385		
Total Volume	gal	20,159			20,159			20,159		
Removal Rates			TYP			TYP			TYP	
BOD	%	25%	30%		25%	30%		25%	30%	
TS	%	60%	60%		60%	60%		60%	60%	
TKN	%	20%	20%		20%	20%		20%	20%	
Phosphorus - Influent	%	20%	20%		20%	20%		20%	20%	
Phosphorus - Recycle	%	60%	20%		60%	20%		60%	20%	
Estimated Solids Concentration	%	2.0%	2%		2.0%	2%		2.0%	2%	
Surface Overflow Rate	gpd/sf	452			820			871		
Scum										
Flow	gpd	200			200			200		
Primary Sludge Production (to Digester)										
Flow (includes scum)	gpd	5,042			6,664			13,150		
BOD	lbs/day	177			227			374		
TSS	lbs/day	808	1.9%		1,078	1.9%		2,160	2.0%	
VSS	lbs/day	607			808			1,620		
TKN	lbs/day	22			21			33		
Total Phosphorus	lbs/day	16			16			46		
Total Effluent										
Flow	mgd	0.343	238	gpm	0.625	434	gpm	0.657	456	gpm
BOD	lbs/day	532	186	mg/L	682	131	mg/L	1,121	205	mg/L
TSS	lbs/day	538	188	mg/L	719	138	mg/L	1,440	263	mg/L
VSS	lbs/day	405	141	mg/L	539	103	mg/L	1,080	197	mg/L
TKN	lbs/day	87	30	mg/L	85	16	mg/L	133	24	mg/L
Total Phosphorus	lbs/day	22	8	mg/L	21	4	mg/L	52	10	mg/L

RBC Trains

Influent										
Flow	MGD	0.343	238	gpm	0.625	434	gpm	0.657	456	gpm
BOD	lbs/day	532	186	mg/L	682	131	mg/L	1,121	205	mg/L
TSS	lbs/day	538	188	mg/L	719	138	mg/L	1,440	263	mg/L
VSS	lbs/day	405	141	mg/L	539	103	mg/L	1,080	197	mg/L
TKN	lbs/day	87	30	mg/L	85	16	mg/L	133	24	mg/L
Total Phosphorus	lbs/day	22	8	mg/L	21	4	mg/L	52	10	mg/L
Number of Trains Operational		2			3			4		

BOD Load per Train		266		227		280	
Basin Dimensions							
Length	ft	26.33		26.33		26.33	
Width	ft	60.83	WS 1066.0	60.83	WS 1066.0	60.83	WS 1066.0
SWD	ft	5.08		5.08		5.08	
Basin Volume	gal	60,867		60,867		60,867	
Total RBC Trains Volume	gal	121,734		182,602		243,469	
Detention Time	hrs	8.52		7.01		8.89	
RBC Unit Length	ft	25.00		25.00		25.00	
RBC Unit Diameter	ft	11.83		11.83		11.83	
Number of Stages - Standard		3.00		3.00		3.00	
Media Area - Standard	sf/unit	100,000		100,000		100,000	
Number of Stages - Nitrification		1.00		1.00		1.00	
Media Area - Nitrification	sf/unit	150,000		150,000		150,000	
Total Media Area per Train	sf	450,000		450,000		450,000	
Total RBC Media In Use	sf	900,000		1,350,000		1,800,000	
Hydraulic Loading Rate (Typ < 2.0)	gal/sf/d	0.38		0.46		0.37	
Total BOD Loading Rate (Typ < 3.0)	lb/1000 sf/d	0.59		0.50		0.62	
Soluble BOD % of Total BOD		50%		50%		50%	
sBOD Loading Rate (Typ < 1.5, 6 peak)	lb/1000 sf/d	0.30		0.25		0.31	
NH3 % of TKN		67%		67%		67%	
NH3 Loading Rate (Typ < 0.3)	lb/1000 sf/d	0.06		0.04		0.05	
Estimated VSS Production Rate	lb/lb BOD	0.60		0.60		0.60	
VSS Produced	lbs/day	293		362		623	
Assumed Effluent Concentrations							
BOD	mg/L	15		15		15	
TKN	mg/L	3		3		3	
Total Phosphorus	mg/L	8	(same as RBC influent)	4	(same as RBC influent)	10	(same as RBC influent)
Effluent							
Flow	mgd	0.343		0.625		0.657	
BOD	lbs/day	43		78		82	
TSS	lbs/day	832		1,081		2,063	
VSS	lbs/day	698		901		1,703	
TKN	lbs/day	9		16		16	
Total Phosphorus	lbs/day	22		21		52	

Final Clarifiers

No. of Clarifiers in Use		2	3	3
Tank Dimensions				
Diameter	ft	28	28	28
Surface Area (each)	sf	616	616	616
Surface Overflow Rate	gpd/sf	278	338	356
Solids Loading Rate	lbs/d/sf	0.68	0.59	1.12
Secondary Sludge (to wet well)				
Estimated Solids Concentration	%	0.6%	0.6%	0.6%
Desired Effluent P Concentration	mg/L	1	1	1
Chemical Sludge (10 lb/lb P)	lbs/day	194	160	468
Flow	gpd	16,242	20,719	40,608
BOD (10 mg/L)	lbs/day	1.35	1.73	3.39
Required Solids Removal (to 10 mg/L)	lbs/day	803	1,029	2,009
VS (75%)	lbs/day	602	772	1,506
TKN (1 mg/L)	lbs/day	0.14	0.17	0.34
Total Phosphorus	lbs/day	19	16	47
Total Effluent (to filters)				
Flow	mgd	0.343	0.625	0.657
BOD (10 mg/L)	lbs/day	29	52	55
TSS (10 mg/L)	lbs/day	29	52	55
TKN (1 mg/L)	lbs/day	3	5	5
Total Phosphorus	lbs/day	3	5	5

Sludge Digestion

Total Sludge Production							
Flow	gpd	5,042		6,664		13,150	
TS	lbs/day	808	1.92%	1,078	1.94%	2,160	1.97%
VS	lbs/day	607		808		1,620	
Mesophilic Digester							
Tank Diameter	ft	45		45		45	
Bottom Cone Depth	ft	5.60		5.60		5.60	
Max SWD	ft	19.67		19.67		19.67	
Volume	kcf	34	256,209	34	256,209	34	256,209
Decant	gpd	1,750		2,000		2,800	
Loading Rate	lbsVS/kcf	18		24		47	
Detention Time	days	78		55		25	
VS Destruction	%	50%		50%		50%	
Decant							
BOD (1000 mg/L)	lbs/day	15		17		23	
TSS (3000 mg/L)	lbs/day	44		50		70	
NH3 (500 mg/L)	lbs/day	7		8		12	
TP (50 mg/L)	lbs/day	0.7		0.8		1.2	
Sludge Discharge							

Flow	gpd	3,292		4,664		10,350	
TS	lbs/day	460	1.68%	624	1.60%	1,280	1.48%
VS	lbs/day	271		367		758	
Volatile Fraction	%	59%		59%		59%	

Sludge Storage							
Tank Diameter	ft	73		73		73	
Bottom Cone Depth	ft	0.00		0.00		0.00	
Max SWD	ft	19.50		19.50		19.50	
Volume	kcf	82		82		82	
	gallons	610,481		610,481		610,481	
Decant	gpd	0		1,500		7,000	
BOD (1000 mg/L)	lbs/day	0		13		58	
TSS (3000 mg/L)	lbs/day	0		38		175	
NH3 (500 mg/L)	lbs/day	0		6		29	
TP (300 mg/L)	lbs/day	0		4		18	
Days of Storage	days	185		193		182	
Total Sludge to Storage	gal/yr	1,201,480		1,702,371		3,777,881	
Total Sludge Hauled	gal/yr	1,201,480	1.68%	1,154,871	2.22%	1,222,881	3.95%

City of Fennimore WWTP Design Model - Activated Sludge, With Primaries and Anaerobic Digestion

Influent Loadings		**Current - Sustained**	Recycle	**Design - Phase 1**	Recycle	**Design - Total**	Recycle
Flow	mgd	0.330		0.608		0.608	
Recycle	gpd	7,500	7,500	13,000	13,000	20,120	20,120
BOD	lbs/day	693		878		878	
Recycle	lbs/day	62.6	62.6	108.40	108.4	26.60	26.6
TS	lbs/day	502		680		680	
Recycle	lbs/day	63	63	125	125	116	116
VSS	lbs/day	377		510		510	
Recycle	lbs/day	47	47	94	94	87	87
TKN	lbs/day	101		91		91	
Recycle	lbs/day	31.3	31.3	54.20	54.2	21.90	21.9
Total Phosphorus	lbs/day	18		16		16	
Recycle	lbs/day	9.4	9.4	16.3	16.3	6.5	6.5
Holding Tank							
Flow	mgd	0.000		0.000		0.005	
BOD	lbs/day	0		0		63	
TS	lbs/day	0		0		42	
VSS	lbs/day	0		0		31	
TKN	lbs/day	0		0		8	
Total Phosphorus	lbs/day	0		0		1	
Waste to Headworks or Digester	H or D	D		H		H	
Septage							
Flow	mgd	0.000		0.000		0.008	
BOD	lbs/day	0		0		469	
TS	lbs/day	0		0		626	
VSS	lbs/day	0		0		469	
TKN	lbs/day	0		0		25	
Total Phosphorus	lbs/day	0		0		16	
Waste to Headworks, Digester or Thickener	H, D, or T	D		H		H	

Primary Clarifiers										
Influent										
Flow	MGD	0.338	234	gpm	0.621	431	gpm	0.640	445	gpm
BOD	lbs/day	756	268	mg/L	986	191	mg/L	1436	269	mg/L
TSS	lbs/day	565	201	mg/L	805	156	mg/L	1463	274	mg/L
VSS	lbs/day	424	150	mg/L	604	117	mg/L	1097	206	mg/L
TKN	lbs/day	132	47	mg/L	146	28	mg/L	147	27	mg/L
Total Phosphorus	lbs/day	27	10	mg/L	32	6	mg/L	39	7	mg/L
No. of Clarifiers in Use		2			2			2		
Tank Dimensions										
Length	ft	35			35			35		
Width	ft	11			11			11		
SWD	ft	7			7			7		
Surface Area	sf	385			385			385		
Total Volume	gal	20,159			20,159			20,159		
Removal Rates			TYP			TYP			TYP	
BOD	%	25%	30%		25%	30%		25%	30%	
TS	%	60%	60%		60%	60%		60%	60%	
TKN	%	20%	20%		20%	20%		20%	20%	
Phosphorus	%	20%	20%		20%	20%		20%	20%	
Estimated Solids Concentration	%	2.0%	2%		2.0%	2%		3.0%	2%	
Surface Overflow Rate	gpd/sf	438			806			831		
Scum										
Flow	gpd	200			200			200		
Primary Sludge Production (to Digester)										
Flow (includes scum)	gpd	2,232			3,096			3,709		
BOD	lbs/day	189			247			359		
TSS	lbs/day	339	1.8%		483	1.9%		878	2.8%	
VSS	lbs/day	254			362			658		
TKN	lbs/day	26			29			29		
Total Phosphorus	lbs/day	5			6			8		
Total Effluent										
Flow	mgd	0.335	233	gpm	0.617	429	gpm	0.636	442	gpm
BOD	lbs/day	567	203	mg/L	740	144	mg/L	1,077	203	mg/L
TSS	lbs/day	226	81	mg/L	322	63	mg/L	585	110	mg/L
VSS	lbs/day	169	61	mg/L	242	47	mg/L	439	83	mg/L
TKN	lbs/day	106	38	mg/L	116	23	mg/L	117	22	mg/L
Total Phosphorus	lbs/day	22	8	mg/L	26	5	mg/L	31	6	mg/L

Biological Treatment Parameters							
Desired MLSS	mg/L	2,500		2,500		2,500	
RAS Concentration	mg/L	5,000		5,000		5,000	
Average RAS Flowrate (Total)	MGD	0.335	100%	0.617	100%	0.636	100%
	gpm	233		429		442	
Desired Sludge Age (MCRT)	days	8		8		8	

Selector Basins										
Influent										
Flow	MGD	0.335	233	gpm	0.617	429	gpm	0.636	442	gpm
BOD	lbs/day	567	203	mg/L	740	144	mg/L	1,077	203	mg/L
TSS	lbs/day	226	81	mg/L	322	63	mg/L	585	110	mg/L
VSS	lbs/day	169	61	mg/L	242	47	mg/L	439	83	mg/L
TKN	lbs/day	106	38	mg/L	116	23	mg/L	117	22	mg/L
Total Phosphorus	lbs/day	22	8	mg/L	26	5	mg/L	31	6	mg/L
RAS										
Flow	MGD	0.335			0.617			0.636		
BOD (10 mg/L)	lbs/day	28			51			53		

TS	lbs/day	13,981			25,746			26,538		
VS	%	75%			75%			75%		
VS	lbs/day	10,485			19,309			19,904		
TKN (1 mg/L)	lbs/day	3			5			5		
Nitrate/Nitrite	lbs/day	41			43			36		
Total P (biological and RAS water)	lbs/day	813			1,109			931		
Anoxic Recycle	% of Inf	50%			40%			25%		
	gpm	116			172			110		
Dimensions Each Basin										
Length	ft	13			13			13		
Width	ft	16			16			16		
SWD	ft	16.00			16.00			16.00		
Basin Volume	gal	24,893			24,893			24,893		
Anoxic Basins (RAS + Recycle)										
Basins Online	#	2			2			2		
Influent Flow	MGD	0.503			0.864			0.796		
Detention Time	hrs	2.4			1.4			1.5		
Water Temperature	^{0}C	15.0			15.0			15.0		
Dissolved Oxygen Concentration	mg/L	0.1			0.1			0.1		
Denite Rate (SDNR=0.07 assumed)	lbs/lbVSS/d	0.041			0.041			0.041		
Active Biomass	lbs	1,465			1,460			1,474		
Denitrification/Nitrate Removal	lbs/day	41			43			36		
BOD Supplied (Recycle)	lbs/day	148.7			158.3			141.3		
BOD Removal	lbs/day	139.0			144.6			122.0		
Anaerobic Basins (Inf + RAS)										
Basins Online	#	2			2			2		
Primary Slg Feed	%	0%			0%			0%		
Influent Flow (Forward Flow only)	MGD	0.335			0.617			0.636		
Detention Time (Forward Flow)	hrs	3.6			1.9			1.9		
Total Selector Detention	hrs	5.9			3.3			3.4		
Effluent										
Flow	mgd	0.671			1.235			1.273		
BOD	lbs/day	595			791			1,130		
TSS	lbs/day	14,207			26,068			27,124		
VSS	lbs/day	10,655			19,551			20,343		
TKN	lbs/day	109			122			123		
Total Phosphorus	lbs/day	835			1,135			962		

Aeration Basins										
Influent										
Flow	MGD	0.671	466	gpm	1.235	858	gpm	1.273	884	gpm
Flow (no RAS)	MGD	0.335	233	gpm	0.617	429	gpm	0.636	442	gpm
BOD	lbs/day	595	106	mg/L	791	77	mg/L	1,130	106	mg/L
BOD (no RAS)	lbs/day	567	203	mg/L	740	144	mg/L	1,077	203	mg/L
TSS	lbs/day	14,207	2,540	mg/L	26,068	2,531	mg/L	27,124	2,555	mg/L
TSS (no RAS)	lbs/day	226	81	mg/L	322	63	mg/L	585	110	mg/L
VSS	lbs/day	10,655	1,905	mg/L	19,551	1,898	mg/L	20,343	1,916	mg/L
VSS (no RAS)	lbs/day	169	61	mg/L	242	47	mg/L	439	83	mg/L
TKN	lbs/day	109	39	mg/L	122	24	mg/L	123	23	mg/L
Total Phosphorus	lbs/day	835	299	mg/L	1,135	220	mg/L	962	181	mg/L
Total Phosphorus (no RAS)	lbs/day	22	8	mg/L	26	5	mg/L	31	6	mg/L
Number of Basins Operational		1			2			3		
Length	ft	54			54			54		
Width	ft	16			16			16		
SWD	ft	16			16			16		
Total Aeration Volume	gallons	103,404			206,807			310,211		
	kcf	14			28			41		
Operating Parameters										
Est WAS (Cell Yield)	lbs/day	347			466			704		
EST WAS (Aeration Volume)	lbs/day	270			540			810		
Est WAS (max)	gpd	8,330			12,951			19,427		
Influent P concentration (to selectors)	mg/L	7.72	4.0% of BOD		5.02	4.0% of BOD		5.86	4.0% of BOD	
Phosphorus Removed Biologically	mg/l	7.72			5.02			5.86		
BOD Loading Rate	lbs/kcf	43			29			27		
F/M Ratio		0.37			0.24			0.23		
Detention Time	hours	7			8			12		
AOR	lbs/day	1,154			1,430			1,807		
Phosphorus not removed biologically	lbs/day	0			0			0		
Final Clarifiers										
Number of Tanks Operational	#	2			2			2		
Diameter	ft	28			28			28		
Surface Area	sf	616			616			616		
Surface Overflow Rate	gpd/sf	272			501			517		
Solids Loading Rate	lbs/d/sf	11			21			22		
WAS										
Chemical Sludge	lbs/day	0			0			0		
Flow	gpd	8,330			12,951			19,427		
BOD (10 mg/L)	lbs/day	0.7			1.1			1.6		
TS	lbs/day	347			540			810		
VS	lbs/day	261			405			608		
TKN (1 mg/L)	lbs/day	0.1			0.1			0.2		
Total Phosphorus	lbs/day	22			26			31		
Effluent										
Flow	mgd	0.327			0.604			0.617		
BOD (10 mg/L)	lbs/day	27			50			51		
TSS (10 mg/L)	lbs/day	27			50			51		
TKN (1 mg/L)	lbs/day	3			5			5		
Total Phosphorus	lbs/day	0			0			0		

WAS Thickening							
Include Sludge Thickening?	Y or N	N		N		Y	
Sludge Production							
Flow	gpd	8,330		12,951		19,427	
BOD	lbs/day	1		1		2	
TSS	lbs/day	347		540		810	
VSS	lbs/day	261		405		608	
TKN	lbs/day	0		0		0	
Total Phosphorus	lbs/day	22		26		31	
Soluble Phosphorus	lbs/day						
Operation Schedule	hrs/day	24.00		24.00		24.00	
Estimated Solids Concentration	%	4.00%		4.00%		4.00%	
Solids Capture Rate	%	95%		95%		95%	
Wash Water	gpm	0.00		0.00		0.00	
Average Flow Rate	gpm	6		9		13	
Solids Loading Rate	lb/hr	14		23		34	
Thickened Sludge							
Flow	gpd	8,330		12,951		2,307	
TS	lbs/day	347		540		770	
VS	lbs/day	248		385		577	
Recycle			mg/L		mg/L		mg/L
Flow	gpd	0		0		17,120	
BOD	lbs/day	0		0		2	
TS	lbs/day	0		0		41	
VS	lbs/day	0		0		30	
TKN (12% of VS + 40 mg/L)	lbs/day	0		0		9	
Phos (4.5% of VS + 10 mg/L)	lbs/day	0		0		3	

Sludge Digestion							
Total Sludge Production							
Flow	gpd	10,563		16,047		6,016	
TS	lbs/day	686	0.78%	1,023	0.76%	1,648	3.28%
VS	lbs/day	502		747		1,236	
Mesophilic Digester							
Tank Diameter	ft	45		45		45	
Bottom Cone Depth	ft	5.50		5.50		5.50	
Max SWD	ft	19.67		19.67		19.67	
Volume	kcf	34.20		34		34	
	gal	255,813		255,813		255,813	
Decant	gpd	7,500		12,000		0	
Loading Rate	lbsVS/kcf	15		22		36	
Detention Time with Decant	days	84		63		43	
Detention Time wiithout Decant	days	24		16		43	
VS Destruction	%	50%		50%		50%	
Decant							
BOD (1000 mg/L)	lbs/day	63		100		0	
TSS (1000 mg/L)	lbs/day	63		100		0	
NH3 (500 mg/L)	lbs/day	31		50		0	
TP (150 mg/L)	lbs/day	9		15		0	
Sludge Discharge							
Flow	gpd	3,063		4,047		6,016	
TS	lbs/day	373	1.46%	549	1.63%	1,030	2.05%
VS	lbs/day	204		299		618	
Volatile Fraction	%	55%		54%		60%	

Sludge Storage							
Tank Diameter	ft	73		73		73	
Bottom Cone Depth	ft	0.00		0.00		0.00	
Max SWD	ft	19.50		19.50		19.50	
Volume	kcf	82		82		82	
	gallons	610,481		610,481		610,481	
Decant	gpd	0		1,000		3,000	
BOD (1000 mg/L)	lbs/day	0		8		25	
TSS (3000 mg/L)	lbs/day	0		25		75	
NH3 (500 mg/L)	lbs/day	0		4		13	
TP (150 mg/L)	lbs/day	0		1		4	
Days of Storage	days	199		200		202	
Total Sludge to Storage	gal/yr	1,117,899		1,477,164		2,195,778	
Total Sludge Hauled	gal/yr	1,117,899	1.46%	1,112,164	2.06%	1,100,778	3.80%

City of Fennimore WWTP Design Model - Activated Sludge, Without Primaries, Aerobic Digestion

Influent Loadings		**Current - Sustained**	Recycle	**Design - Phase 1**	Recycle	**Design - Total**	Recycle
Flow	mgd	0.330		0.608		0.608	
Recycle	gpd	13,500	13,500	15,000	15,000	26,038	25,913
BOD	lbs/day	693		878		878	
Recycle	lbs/day	56.0	56.0	66.70	66.7	23.30	23.3
TS	lbs/day	502		680		680	
Recycle	lbs/day	113	113	142	142	123	123
VSS	lbs/day	377		510		510	
Recycle	lbs/day	84	84	106	106	92	92
TKN	lbs/day	101		91		91	
Recycle	lbs/day	39.0	39.0	45.00	45.0	23.70	23.7
Total Phosphorus	lbs/day	18		16		16	
Recycle	lbs/day	11.3	11.3	12.9	12.9	7.1	7.1
Holding Tank							
Flow	mgd	0.000		0.000		0.005	
BOD	lbs/day	0		0		63	
TS	lbs/day	0		0		42	
VSS	lbs/day	0		0		31	
TKN	lbs/day	0		0		8	
Total Phosphorus	lbs/day	0		0		1	
Waste to Headworks or Digester	H or D	D		H		H	
Septage							
Flow	mgd	0.000		0.000		0.008	
BOD	lbs/day	0		0		469	
TS	lbs/day	0		0		626	
VSS	lbs/day	0		0		469	
TKN	lbs/day	0		0		25	
Total Phosphorus	lbs/day	0		0		16	
Waste to Headworks, Digester or Thickener	H, D, or T	D		H		H	

Total Influent with Recycle

Influent										
Flow	MGD	0.344	239	gpm	0.623	432	gpm	0.646	449	gpm
BOD	lbs/day	749	261	mg/L	945	182	mg/L	1433	266	mg/L
TSS	lbs/day	615	215	mg/L	822	158	mg/L	1470	273	mg/L
VSS	lbs/day	461	161	mg/L	616	119	mg/L	1102	205	mg/L
TKN	lbs/day	140	49	mg/L	136	26	mg/L	148	28	mg/L
Total Phosphorus	lbs/day	29	10	mg/L	29	6	mg/L	39	7	mg/L

Biological Treatment Parameters							
Desired MLSS	mg/L	2,500		2,500		2,500	
RAS Concentration	mg/L	5,000		5,000		5,000	
Average RAS Flowrate (Total)	MGD	0.344	100%	0.623	100%	0.646	100%
	gpm	239		432		449	
Desired Sludge Age (MCRT)	days	8		8		8	

Selector Basins

Influent										
Flow	MGD	0.344	239	gpm	0.623	432	gpm	0.646	449	gpm
BOD	lbs/day	749	261	mg/L	945	182	mg/L	1,433	266	mg/L
TSS	lbs/day	615	215	mg/L	822	158	mg/L	1,470	273	mg/L
VSS	lbs/day	461	161	mg/L	616	119	mg/L	1,102	205	mg/L
TKN	lbs/day	140	49	mg/L	136	26	mg/L	148	28	mg/L
Total Phosphorus	lbs/day	29	10	mg/L	29	6	mg/L	39	7	mg/L

RAS				
Flow	MGD	0.344	0.623	0.646
BOD (10 mg/L)	lbs/day	29	52	54
TS	lbs/day	14,324	25,958	26,940
VS	%	75%	75%	75%
VS	lbs/day	10,743	19,469	20,205
TKN (1 mg/L)	lbs/day	3	5	5
Nitrate/Nitrite	lbs/day	54	48	44
Total P (biological and RAS water)	lbs/day	675	909	821
Anoxic Recycle	% of Inf	50%	35%	25%
	gpm	119	151	112
Dimensions Each Basin				
Length	ft	13	13	13
Width	ft	16	16	16
SWD	ft	16.00	16.00	16.00
Basin Volume	gal	24,893	24,893	24,893
Anoxic Basins (RAS + Recycle)				
Basins Online	#	2	2	2
Influent Flow	MGD	0.515	0.840	0.808
Detention Time	hrs	2.3	1.4	1.5
Water Temperature	^0C	15.0	15.0	15.0
Dissolved Oxygen Concentration	mg/L	0.1	0.1	0.1
Denite Rate (SDNR=0.07 assumed)	lbs/lbVSS/d	0.041	0.041	0.041
Active Biomass	lbs	1,504	1,487	1,520
Denitrification/Nitrate Removal	lbs/day	54	48	44
BOD Supplied (Recycle)	lbs/day	194.4	174.4	185.9
BOD Removal	lbs/day	184.1	163.8	149.5
Anaerobic Basins (Inf + RAS)				
Basins Online	#	2	2	2
Influent Flow	MGD	0.344	0.623	0.646
Detention Time	hrs	3.5	1.9	1.8
Total Selector Detention	hrs	5.8	3.3	3.3

Effluent				
Flow	mgd	0.687	1.245	1.292
BOD	lbs/day	778	997	1,487
TSS	lbs/day	14,939	26,780	28,410
VSS	lbs/day	11,203	20,085	21,307
TKN	lbs/day	143	141	154
Total Phosphorus	lbs/day	704	938	861

Aeration Basins										
Influent										
Flow	MGD	0.687	477	gpm	1.245	865	gpm	1.292	897	gpm
Flow (no RAS)	MGD	0.344	239	gpm	0.623	432	gpm	0.646	449	gpm
BOD	lbs/day	778	136	mg/L	997	96	mg/L	1,487	138	mg/L
BOD (no RAS)	lbs/day	749	261	mg/L	945	182	mg/L	1,433	266	mg/L
TSS	lbs/day	14,939	2,607	mg/L	26,780	2,579	mg/L	28,410	2,636	mg/L
TSS (no RAS)	lbs/day	615	215	mg/L	822	158	mg/L	1,470	273	mg/L
VSS	lbs/day	11,203	1,955	mg/L	20,085	1,934	mg/L	21,307	1,977	mg/L
VSS (no RAS)	lbs/day	461	161	mg/L	616	119	mg/L	1,102	205	mg/L
TKN	lbs/day	143	50	mg/L	141	27	mg/L	154	29	mg/L
Total Phosphorus	lbs/day	704	246	mg/L	938	181	mg/L	861	160	mg/L
Total Phosphorus (no RAS)	lbs/day	29	10	mg/L	29	6	mg/L	39	7	mg/L
Number of Basins Operational		1			2			3		
Length	ft	60			60			60		
Width	ft	18			18			18		
SWD	ft	16			16			16		
Total Aeration Volume	gallons	129,254			258,509			387,763		
	kcf	17			35			52		
Operating Parameters										
Est WAS (Cell Yield)	lbs/day	583			751			1,205		
EST WAS (Aeration Volume)	lbs/day	338			675			1,013		
Est WAS (max)	gpd	13,974			18,011			28,905		
Influent P concentration (to selectors)	mg/L	10.09			5.57			7.32		
Phosphorus Removed Biologically	mg/l	10.09	4% of BOD		5.57	4% of BOD		7.32	4% of BOD	
BOD Loading Rate	lbs/kcf	45			29			29		
F/M Ratio		0.38			0.25			0.25		
Detention Time	hours	9			10			14		
AOR	lbs/day	1,513			1,747			2,343		
Phosphorus not removed biologically	lbs/day	0			0			0		
Final Clarifiers										
Number of Tanks Operational	#	2			3			3		
Diameter	ft	28			28			28		
Surface Area	sf	616			616			616		
Surface Overflow Rate	gpd/sf	279			337			350		
Solids Loading Rate	lbs/d/sf	12			14			15		
WAS										
Chemical Sludge	lbs/day	0			0			0		
Flow	gpd	13,974			18,011			28,905		
BOD (10 mg/L)	lbs/day	1.2			1.5			2.4		
TS	lbs/day	583			751			1,205		
VS	lbs/day	437			563			904		
TKN (1 mg/L)	lbs/day	0.1			0.2			0.2		
Total Phosphorus	lbs/day	29			29			39		
Effluent										
Flow	mgd	0.330			0.604			0.617		
BOD (10 mg/L)	lbs/day	27			50			51		
TSS (10 mg/L)	lbs/day	27			50			51		
TKN (1 mg/L)	lbs/day	3			5			5		
Total Phosphorus	lbs/day	0			0			0		

Sludge Thickening							
Include Sludge Thickening?	Y or N	N		N		Y	
Sludge Production							
Flow	gpd	13,974		18,011		28,905	
BOD	lbs/day	1		2		2	
TSS	lbs/day	583		751		1,205	
VSS	lbs/day	437		563		904	
TKN	lbs/day	0		0		0	
Total Phosphorus	lbs/day	29		29		39	
Soluble Phosphorus	lbs/day						
Operation Schedule	hrs/day	24.00		24.00		24.00	
Estimated Solids Concentration	%	2.50%		2.50%		2.50%	
Solids Capture Rate	%	95%		95%		95%	
Wash Water	gpm	0.00		0.00		0.00	
Average Flow Rate	gpm	10		13		20	
Solids Loading Rate	lb/hr	24		31		50	
Thickened Sludge							
Flow	gpd	13,974		18,011		5,492	
TS	lbs/day	583		751		1,145	
VS	lbs/day	415		535		859	
Recycle			mg/L		mg/L		mg/L
Flow	gpd	0		0		23,413	
BOD	lbs/day	0		0		2	
TS	lbs/day	0		0		60	
VS	lbs/day	0		0		45	
TKN	lbs/day	0		0		13	
Phos	lbs/day	0		0		4	

Aerobic Sludge Digestion

Total Sludge Production							
Flow	gpd	13,974		18,011		5,492	
TS	lbs/day	583	0.50%	751	0.50%	1,145	2.50%
VS	lbs/day	415		535		859	
Aerobic Digester							
Tank Diameter	ft	45		45		45	
Bottom Cone Depth	ft	5.50		5.50		5.50	
SWD							
Summer	ft	19.67		19.67		19.67	
Winter	ft	19.67		19.67		19.67	
Summer Volume	kcf	34	255,813 gal	34	255,813 gal	34	255,813 gal
Winter Volume	kcf	34	255,813 gal	34	255,813 gal	34	255,813 gal
Sludge Temperatures							
Summer	^{0}F	60		60		60	
Winter	^{0}F	35		35		35	
Loading Rate							
Summer	lbsVS/kcf	12		16		25	
Winter	lbsVS/kcf	12		16		25	
Detention Time without Decant							
Summer	days	18		14		47	
Winter	days	18		14		47	
Detention Time with Decant							
Summer	days	86		64		47	
Winter	days	86		64		47	
VS Destruction							
Summer	%	33%		31%		42%	
Winter	%	12%		9%		21%	
Decant							
Volume	gpd	11,000		14,000		0	
BOD (500 mg/L)	lbs/day	46		58		0	
TS (1000 mg/L)	lbs/day	92		117		0	
TKN (350 mg/L)	lbs/day	32		41		0	
Phos (100 mg/L)	lbs/day	9		12		0	
Sludge Discharge	gpd	2,974		4,011		5,492	
Solids	lbs/day	397	1.60%	527	1.57%	874	1.91%
VS	lbs/day	253		340		588	
Volatile Fraction	%	64%		65%		67%	

Sludge Storage							
Tank Diameter	ft	73		73		73	
Bottom Cone Depth	ft	0.00		0.00		0.00	
Max SWD	ft	19.50		19.50		19.50	
Volume	kcf	82		82		82	
	gallons	610,481		610,481		610,481	
Decant	gpd	0		1,000		2,500	
BOD (1000 mg/L)	lbs/day	0		8		21	
TSS (3000 mg/L)	lbs/day	0		25		63	
NH3 (500 mg/L)	lbs/day	0		4		10	
TP (150 mg/L)	lbs/day	0		1		3	
Days of Storage	days	205		203		204	
Total Sludge to Storage	gal/yr	1,085,533		1,463,917		2,004,577	
Total Sludge Hauled	gal/yr	1,085,533	1.60%	1,098,917	2.00%	1,092,077	3.25%

Appendix O

Environmental Impacts

- **Endangered Resources Preliminary Review**
- **Wetlands Inventory**
- **USFWS Endangered Resources Review**

Endangered Resources Preliminary Assessment

Created on **Monday, September 21, 2015**. This report is good for one year after the created date.

Results

No actions required/recommended. No endangered resources have been recorded in this area. For additional information on Endangered Resources (ER) Reviews, please visit: http://dnr.wi.gov/topic/ERReview/Review.html

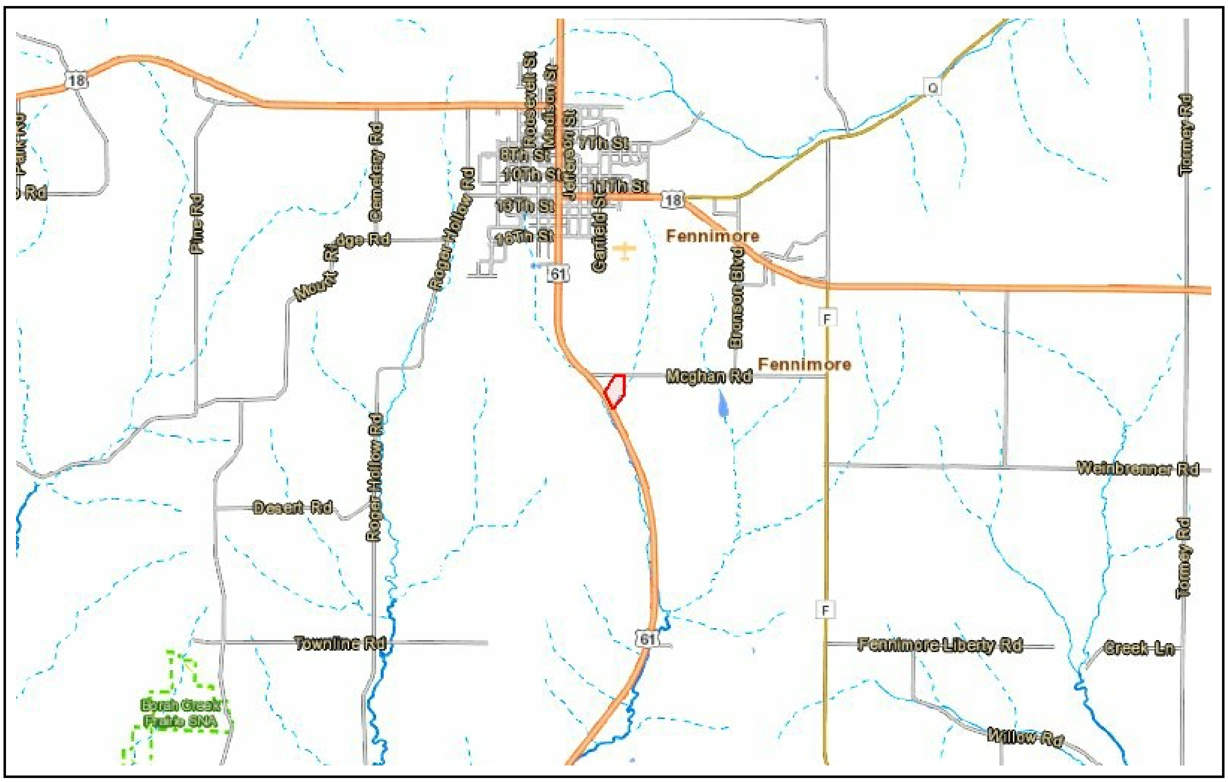
Project Information

Landowner name	City of Fennimore
Project address	
Project description	WWTP Facilities Plan

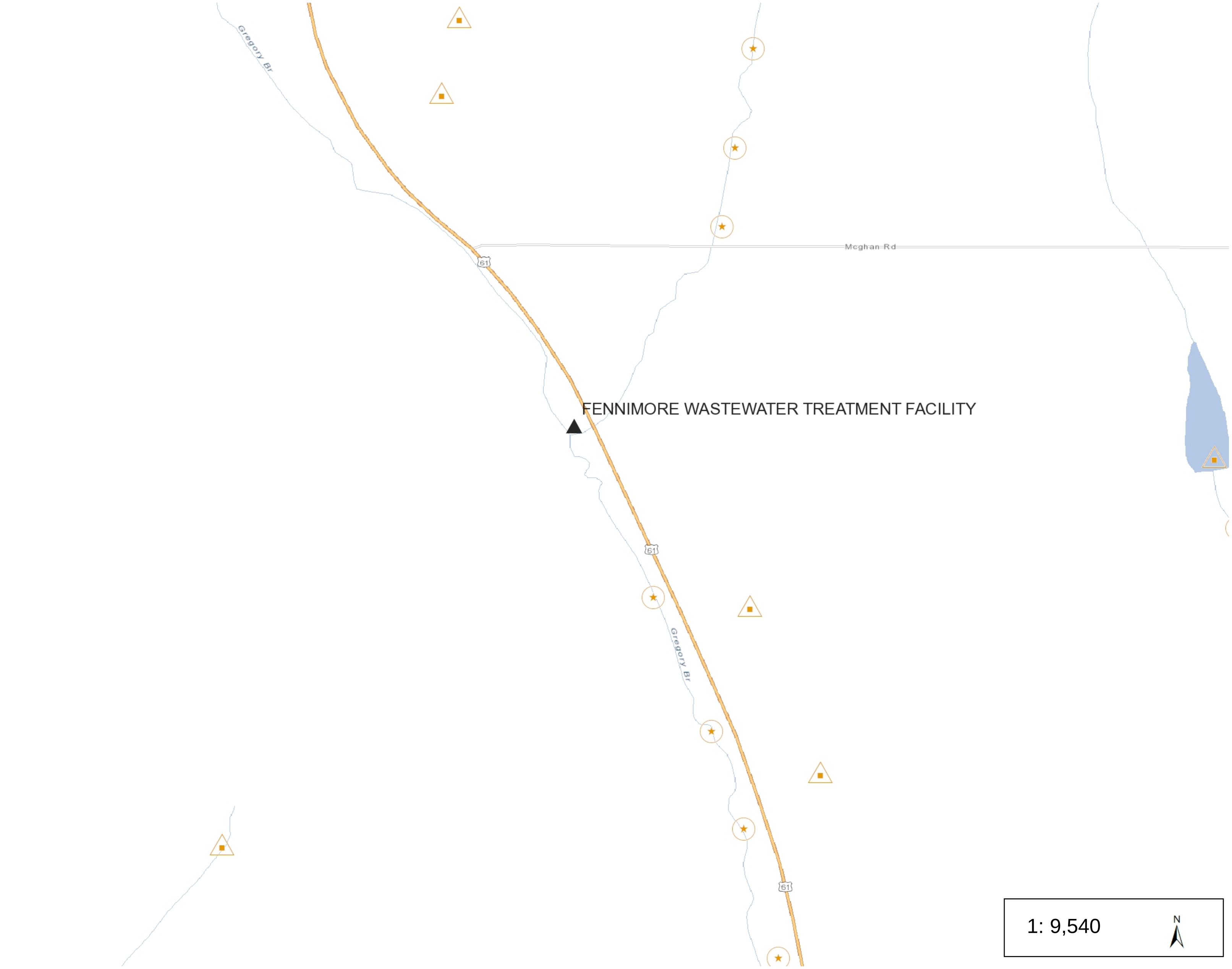
Project Questions

Does the project involve a public property?	Yes
Is the project on a federal property?	No
Is the project federally funded?	Yes
Is the project a utility, agricultural, forestry or bulk sampling (associated with mining) project?	No
Is the project property in Managed Forest Law or Managed Forest Tax Law?	No

Project Area Maps



Fennimore WWTP Site Wetlands Inventory



Legend

- Surface Water Outfalls
- Wetland Class Points
  - Dammed pond
  - Excavated pond
  - Filled excavated pond
  - Filled/drained wetland
  - Wetland too small to delineate
- Filled Points
- Wetland Class Areas
  - Wetland
  - Upland
- Filled Areas
- NRCS Wetspots
- Wetland Indicators
- Rivers and Streams
- Open Water

1: 9,540

N

0.3 0 0.15 0.3 Miles

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Notes

TOWN & COUNTRY
ENGINEERING, INC.

October 8, 2015

Peter Fasbender
U.S. Fish and Wildlife Service
Green Bay Wisconsin Field Office (GBFO)
2661 Scott Tower Drive
New Franken, Wisconsin 54229

Subject: Proposed WWTP Upgrades; City of Fennimore, Grant County, WI

To the Endangered Species Review Program:

I have conducted a Proposed Endangered Resources (ER) Review for the above-referenced project according to the US Fish and Wildlife technical assistance website and have concluded that it will have no effect on threatened or endangered resources. I am submitting this letter to document the review, as City of Fennimore is seeking federal funding for the construction from the U.S. Department of Agriculture Rural Development Rural Utilities Service. We understand that according to Section 7 technical assistance guidance provided the website that no concurrence is required by US Fish and Wildlife Service for no effect determinations.

Location and description of the proposed project

Location of proposed project: T6N R2W Section 30 in Grant County, WI.

Detailed description of the proposed project and associated disturbance:

> The City of Fennimore is planning improvements to the City's existing wastewater treatment facility (WWTF). Construction will take place only at the existing WWTF site.

Start date (on site disturbance): Summer 2016

End date: Winter 2017

Detailed description of the habitat types and current land use within the proposed impact area:

> The existing WWTF site include several buildings, treatment structures/tanks, a paved holding pond, paved site roads, grassed areas (mowed) and few small stands of trees.

Wetlands and waterbodies within one mile of the project area, and any known or suspected impacts of the proposed project to these wetlands and waterbodies:

Gregory Branch of the Upper Grant River Watershed is adjacent to the project area and other unnamed tributaries of the Gregory Branch and the Rogers Branch of the Upper Grant River are within one mile. No wetlands have been identified within the proposed project site.

Endangered resources recorded from within the project area and/or surrounding area

Review of the US Fish and Wildlife species list by county is provided on the following website: http://www.fws.gov/midwest/endangered/section7/s7process/index.html

This website identified the species in the following table as endangered, threatened, proposed, or candidate species for Grant County, Wisconsin. The habitat at the proposed project site was compared to that found in the US Fish & Wildlife Fact Sheets and analysis of this information is provided in the column headed "Determination":

Species	Status	Habitat	Determination
Northern long-eared bat *Myotis septentrionalis*	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. During summer, roosts and forages in upland forests.	There are no caves, mines, or upland forest areas present at the site. A small stand of oak trees on the west side of the site along Highway 61 may be disturbed, but is not adjacent to any areas that could be considered forrested.
Whooping crane Grus americanus	**Non-essential experimental population	Open wetlands and lakeshores	No wetlands have been identified at the project site.
Higgins eye pearly mussel *(Lampsilis higginsii)*	Endangered	Lower Wisconsin and Mississippi Rivers	At the project site there no larger rivers, only a small stream adjacent WWTF.
Sheepnose (*Plethobasus cyphyus*)	Endangered	Shallow areas in larger rivers and streams	At the project site there no larger rivers, only a small stream adjacent WWTF. The adjacent stream is outside the site fence and will not be disturbed during construction

Spectaclecase (*Cumberlandia monodonta*)	Endangered	Mississippi River **Note:** EO for Grant county is historic-last observation 1982	At the project site there no larger rivers, only a small stream adjacent WWTF.
Hine's emerald dragonfly *(Somatochlora hineana)*	Endangered	Calcareous streams & associated wetlands overlying dolomite bedrock	No wetlands have been identified at the project site. The adjacent stream is outside the site fence and will not be disturbed during construction.
Mead's milkweed *(Asclepias meadii)*	Threatened	Upland tallgrass prairie or glade/barren habitat **Note:** all the Mead's milkweed sites in Wisconsin are reintroduction attempts and occur on protected conservation lands.	No protected conservation lands are present at or near the project site.
Northern monkshood *(Aconitum noveboracense)*	Threatened	North facing slopes (shaded to partially shaded cliffs, algific talus slopes, or on cool, streamside sites)	There are no north-facing slopes at the project site. The adjacent stream is outside the site fence and will not be disturbed during construction.
Prairie bush-clover *(Lespedeza leptostachya)*	Threatened	Dry to mesic prairies, with gravelly soil	The project site is currently covered by mowed grass areas that were established following previous plant construction. No prairies are present at the site.

Based on this analysis of habitats, we have concluded that the proposed project it will have no effect on threatened or endangered resources. If there are concerns or questions regarding this review, please free to give me a call at 608-273-3350.

Sincerely,
TOWN & COUNTRY ENGINEERING, INC.

Amy M Bares

Amy M. Bares, P.E.
Project Engineer

Enclosures

cc: Mr. Dennis Biddick, Director of Public Works, City of Fennimore *(860 Lincoln Avenue, Fennimore, WI 53809)*

Ms. Lisa Mandell, Deputy Field Supervisor-Twin Cities Ecological Services Field Office (*4101 American Boulevard, East Bloomington, MN 55425*)

AMB
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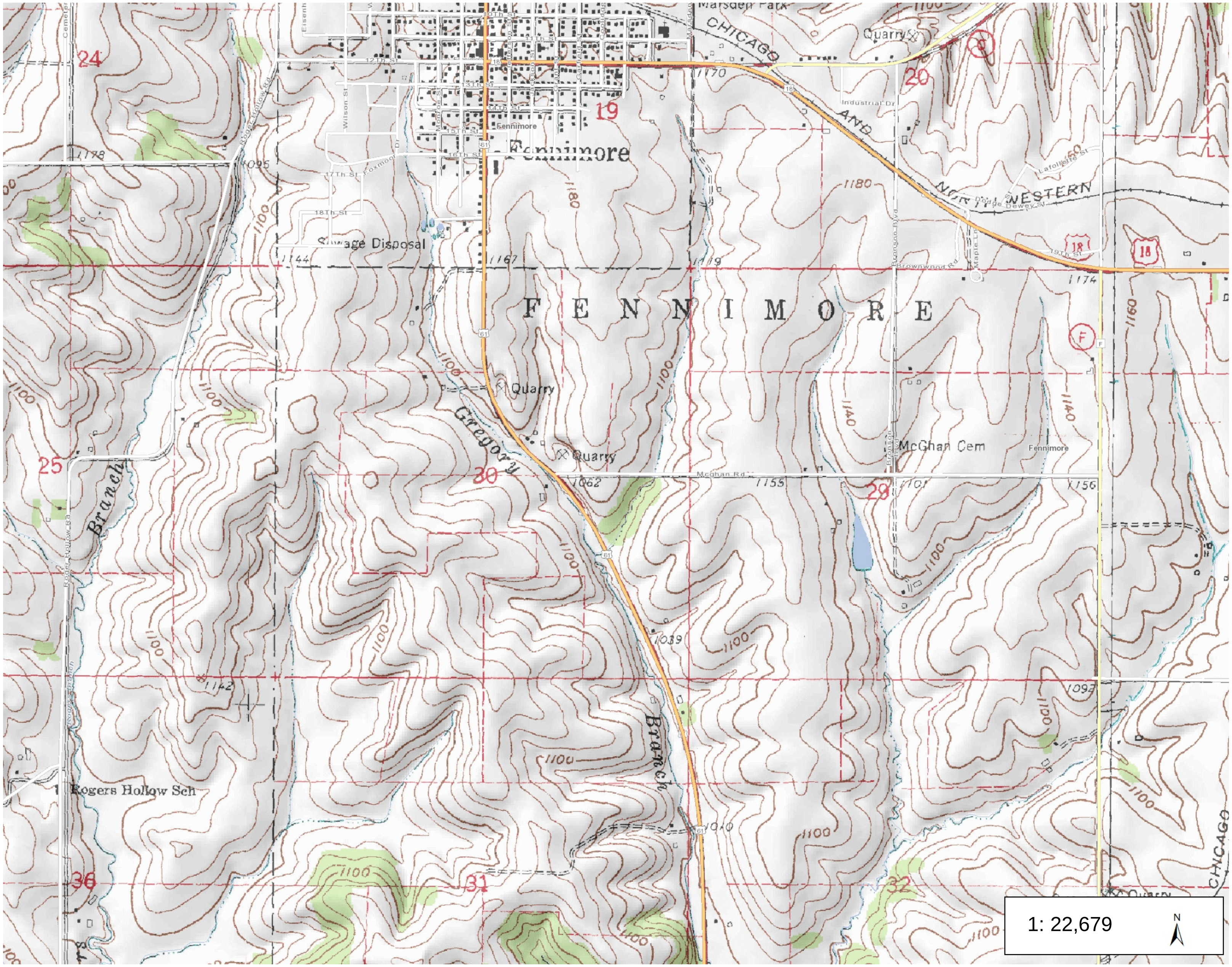
City of Fennimore WWTP Outfall Location



1: 22,679

N

Legend

Rivers and Streams

Open Water

Notes

0.7 0 0.36 0.7 Miles

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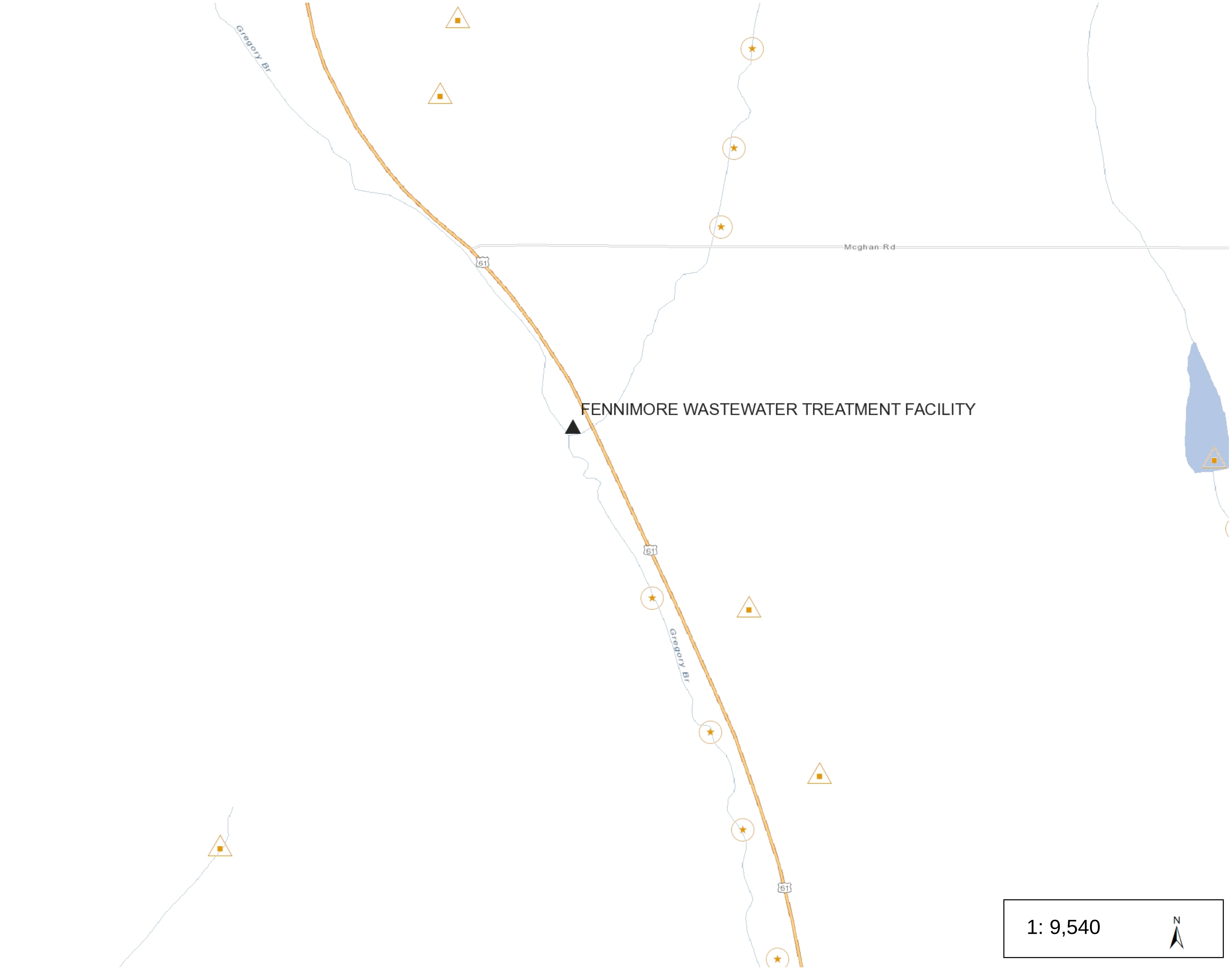
Fennimore WWTP Site Wetlands Inventory



Legend

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N

Notes

0.3 0 0.15 0.3 Miles

NAD_1983_HARN_Wisconsin_TM

DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made aregarding accuracy, applicability for a particular use, completemenss, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/org/legal/


61
Approximate Outfall Location
© 2015 Google
Google earth
Google earth
feet
500
meters
100

Appendix P

Parallel Cost Ratio and Septage Percentage Calculations

- **Parallel Cost – RC Loading**
- **Septage Percentage – RC2 Loading**
- **RC and RC2 Capital Costs**

Future Loadings Projections - Parallel Cost Calculations
City of Fennimore WWTP

Peaking Factors Applied to Base Flow (Items 1 and 2)

Maximum Weekly PF	125%
Maximum Daily PF	175%
Peak Hourly PF	250%
2035 Population Projection =	2,875

		Data Base			Flow			BOD			SS			TKN			Phosphorus	
		Quantity	Units	Rate	Units	Flow	Rate	Units	Loading	Rate	Units	Loading	Rate	Units	Loading	Rate	Units	Loading
						mgd			lbs/day			lbs/day			lbs/day			lbs/day
1	City Base Loadings																	
	Residential	2,525	capita	56	gpcd	0.141												
	Commercial	126	customer	237	gpcd	0.030												
	Public	52	customer	265	gpcd	0.014												
	General Industrial		customer		gpcd	0.000												
	Annual Average					0.185			522			397	40	mg/l	62	7	mg/l	10.8
	Current Sustained Base Loading					0.185			638			462			62			10.8
2	Future City Increases																	
	Population Growth	175	capita	60	gpcd	0.011	0.22	ppcd	39	0.20	ppcd	35	40	mg/l	4	7	mg/l	0.6
	Commercial Expansion	6	acres	1,000	gpad	0.006	250	mg/l	13	250	mg/l	13	40	mg/l	2	7	mg/l	0.4
	Public Sector Growth	0.38	%	13,300	gpd	0.001	250	mg/l	2	250	mg/l	2	40	mg/l	0	7	mg/l	0.1
	General Industrial Expansion		acres		gpad	0.000	250	mg/l	0	250	mg/l	0	40	mg/l	0	7	mg/l	0.0
	Subtotal					0.018			53			50			6			1.0
3	Additional Contributors						mg/L			mg/L								
	Septage Hauling						7,500	mg/l	0	10,000	mg/l	0	400	mg/l	0	250	mg/l	0.0
	Holding Tank Waste						1,500	mg/l	0	1,000	mg/l	0	200	mg/l	0	17	mg/l	0.0
	Subtotal					0.0000			0			0			0			0.0
4	Future Major Industry Request																	
	Unallocated Industrial					0.000	250	mg/l	0	250	mg/l	0	40	mg/l	0	7	mg/l	0.0
	Subtotal					0.000			0			0			0.0			0.0
5	Clear Water Infiltration/Inflow																	
	Existing Dry Weather Infiltration					0.031												
	Existing Sustained I/I					0.320												
	Future Sustained I/I	175	capita	40	gpcd	0.007												
	Proj. Sustained I/I Reduction					0.000												
	Daily Wet Weather I/I					0.501												
	Instantaneous Inflow Factor	(multiplied x daily I/I)		3.00		1.503												
	Maximum Weekly I/I					0.470												
	Annual Average I/I					0.094												
6	Loadings Projections																	
	Average Dry Weather					0.234												
	Average Annual					0.304			575			446			68			12
	Design (Maximum Sustained)					**0.530**			**691**			**512**			**68**			**12**
	Maximum Weekly					0.730			691			512			68			12
	Maximum Daily					0.863												
	Peak Hourly					2.016												
7	Current Sustained Loading					0.330			666			502						
8	Existing Facility Rated Capacity					0.620			1,298			1,278		NH3-N	52			

No current and future indsutrial loads, half of future loads (includes half septic and holding tank waste). Current BOD and SS loads reduced by 8% (percentage of industrial flow)

J:\JOB#S\Fennimore\FE 04 08\10 Design Information\10.2 Process-Civil\FE Loading Projections
9/25/2015

Future Loadings Projections - Septage Percentage Calculations
City of Fennimore WWTP

Peaking Factors Applied to Base Flow (Items 1 and 2)

Maximum Weekly PF	125%
Maximum Daily PF	175%
Peak Hourly PF	250%
2035 Population Projection =	2,875

	Data Base Quantity	Data Base Units	Rate	Flow Units	Flow	BOD Rate	BOD Units	BOD Loading	SS Rate	SS Units	SS Loading	TKN Rate	TKN Units	TKN Loading	Phosphorus Rate	Phosphorus Units	Phosphorus Loading
					mgd			lbs/day			lbs/day			lbs/day			lbs/day
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General Industrial Expansion		acres		gpad	0.000	250	mg/l	0	250	mg/l	0	40	mg/l	0	7	mg/l	0.0
Subtotal					0.018			53			50			6			1.0
3 Additional Contributors						mg/L			mg/L								
Septage Hauling						7,500	mg/l	0	10,000	mg/l	0	400	mg/l	0	250	mg/l	0.0
Holding Tank Waste						1,500	mg/l	0	1,000	mg/l	0	200	mg/l	0	17	mg/l	0.0
Subtotal					0.0000			0			0			0			0.0
4 Future Major Industry Request																	
Unallocated Industrial					0.000	250	mg/l	0	250	mg/l	0	40	mg/l	0	7	mg/l	0.0
Subtotal					0.000			0			0			0.0			0.0
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No current and future indsutrial loads, half of future loads, no hauled waste. Current BOD and SS loads reduced by 8% (percentage of industrial flow)

City of Fennimore
WWTP Facilities Planning
Parallel Cost and Septage Percentage Summary

			DC - Alt 3	RC - Alt 3	RC2 - Alt 3
1	Site Work		$156,580	$156,580	$156,580
2	New Headworks w/ Grit Removal		$1,160,300	$1,160,300	$1,160,300
3	Influent Pumping		$240,580	$240,580	$240,580
4	Equalization Tank		$48,250	$48,250	$48,250
5	Primary Clarifiers - Demolition		$31,000	$31,000	$31,000
6	Splitter/Selectors		$411,510	$411,510	$411,510
7	Secondary Treatment - Demo and New Basins		$897,400	$792,827	$792,827
8	Process Building (Blowers/RAS/WAS)		$828,890	$812,690	$812,690
9	Chemical Feed		$67,900	$67,900	$67,900
10	Final Clarifiers - Addition of 3rd Clarifier		$411,480	$411,480	$411,480
11	Tertiary Filtration - Demolition		$60,920	$60,920	$60,920
12	Solids Handling/Thickening		$0	$0	$0
13	Digester - Conversion to Aerobic		$370,065	$370,065	$370,065
14	Sludge Storage		$0	$0	$0
15	Waste Receiving Station		$293,115	$293,115	
16	Lab/Contros Building		$170,638	$170,638	$170,638
17	Garage - Upgrade Existing		$76,944	$76,944	$76,944
	Subtotal		$5,225,572	$5,104,799	$4,811,684
	Electrical and Instrumentation	20%	$1,045,114	$1,020,960	$962,337
	Additional Contractor Costs	8%	$501,655	$490,061	$461,922
	Contingencies	10%	$677,234	$661,582	$623,594
	Engineering, Admin, Legal	15%	$1,015,851	$992,373	$935,391
	Total Project Cost		**$8,465,427**	**$8,269,774**	**$7,794,927**

Notes:

DC (Design Capacity) cost is based on Alternative 3

RC (Reduced Capacity) cost is for Parallel Cost percentage calculation

PC = RC/DC = **97.7%**

RC2 (Reduced Capacity 2) cost is for Septage Percentage calculation

SP = (RC-RC2)/DC = **5.6%**

City of Fennimore
WWTP Facilities Planning
Capital Costs for WWTP Upgrade Alternatives
Reduced Loading Condition for Parallel Cost Percentage
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

		Quantity	Units	Unit Cost	Install Factor	Total Cost
1	**Site Work**					
	Erosion Control	1	LS	$1,000	1.00	$1,000
	Site Grading	1	LS	$7,500	1.00	$7,500
	Site Fencing	500	LF	$20	1.00	$10,000
	Front Gate Security	1		$20,000	1.00	$20,000
	Dewatering and Sheeting	1	LS	$10,000	1.00	$10,000
	Site Conditions/Constraints	1	LS	$10,000	1.00	$10,000
	Asphalt Paving	702	SY	$40	1.00	$28,080
	Sidewalks	400	SF	$7.50	1.00	$3,000
	Site Piping Valves	20	EA	$1,500	1.00	$30,000
	Painting		LS	$15,000	1.00	$0
	Landscaping	2,500	SF	$10	1.00	$25,000
	Seed, Fertilizer, Mulch	1,200	SY	$10	1.00	$12,000
						$156,580
2	**Headworks**					
2A	***New Screening Building***					
	Construction					
	Excavation	98	CY	$30	1.00	$2,940
	Rock Excavation	415	CY	$100	1.00	$41,500
	Structural fill	85	CY	$25	1.00	$2,125
	Circular walls	0	CY	$675	1.00	$0
	Straight walls	144	CY	$600	1.00	$86,400
	Slab on soil	78	CY	$550	1.00	$42,900
	Shored slab	0	CY	$1,100	1.00	$0
	Shored beams	0	CY	$1,700	1.00	$0
	Columns	0	CY	$1,150	1.00	$0
	Concrete fill	55	CY	$400	1.00	$22,000
	Misc concrete	4	CY	$750	1.00	$3,000
	Block walls - split face	2,888	SF	$30	1.00	$86,640
	Block wall - plain	875	SF	$20	1.00	$17,500
	Concrete plank	1,932	SF	$15	1.00	$28,980
	Roofing	1,932	SF	$20	1.00	$38,640
	Architectural	1,932	SF	$20	1.00	$38,640
	Doors and windows	1	LS	$20,000	1.00	$20,000
	Stairs and railings	54	LF	$75	1.00	$4,050
	Miscellaneous metals	1	LS	$25,000	1.00	$25,000
	Equipment Installation					
	Mechanical screen and compactor	1	EA	$90,000	1.25	$112,500
	Sampling equipment	1	EA	$3,000	1.25	$3,750
	Odor Control System	1	EA	$25,000	1.00	$25,000
	Piping and Valves - Interior					
	10" Influent	40	LF	$225	1.00	$9,000
	6" Bypass	50	LF	$75	1.00	$3,750
	Non-actuated valves	1	LS	$7,500	1.00	$7,500
	Actuated valves	5	EA	$1,500	1.00	$7,500
	Process gates	8	EA	$3,500	1.00	$28,000
	Piping and Valves - Yard					
	10" Influent	260	LF	$225	1.00	$58,500
	6" To Overflow	110	LF	$125	1.00	$13,750
	Painting					
	Structure surfaces	6,500	SF	$5	1.00	$32,500
	Pipes	1,100	SF	$10	1.00	$11,000
	Equipment	10	EA	$750	1.00	$7,500
	HVAC	1,932	SF	$50	1.00	$96,600
	Plumbing	1,932	SF	$15	1.00	$28,980
						$906,145
2B	***Upgrade Existing Screening***					
	Demolition					
	Screen removal	1	EA	$2,500	1.00	$2,500
	Channels	1	LS	$5,000	1.00	$5,000
	Floor penetration	1	LS	$1,500	1.00	$1,500
	Structure modifications	1	LS	$7,500	1.00	$7,500
	Equipment installation					
	Mechanical screen and compactor	1	EA	$90,000	1.40	$126,000
	Sampling equipment	1	EA	$3,000	1.25	$3,750
	Plumbing	300	SF	$12	1.00	$3,600
	Painting					
	Structure surfaces	950	SF	$8	1.00	$7,600
	Pipes	100	SF	$10	1.00	$1,000
	Equipment	3	EA	$750	1.00	$2,250
	Repairs to EQ Tank Splitter Structure	1	LS	$5,000	1.00	$5,000
						$165,700

City of Fennimore
WWTP Facilities Planning
Capital Costs for WWTP Upgrade Alternatives
Reduced Loading Condition for Parallel Cost Percentage
Alternative 3 - Conventional Activated Sludge without Primaries, Convert Digester to Aerobic

		Quantity	Units	Unit Cost	Install Factor	Total Cost
2C	***New Grit Removal Addition***					
	Construction					
	Excavation	20	CY	$100	1.00	$2,000
	Rock Excavation	150	CY	$100	1.00	$15,000
	Structural fill	25	CY	$25	1.00	$625
	Circular walls	10	CY	$750	1.00	$7,500
	Straight walls	25	CY	$650	1.00	$16,250
	Slab on soil	15	CY	$550	1.00	$8,250
	Concrete fill	5	CY	$400	1.00	$2,000
	Stairs and railings	50	LF	$75	1.00	$3,750
	Miscellaneous metals	1	LS	$7,500	1.00	$7,500
	Equipment Installation					
	Grit removal equipment	1	EA	$35,000	1.25	$43,750
	Grit pump	1	LS	$30,000	1.25	$37,500
	Grit washer	1	EA	$75,000	1.25	$93,750
	Piping and Valves - Interior					
	6" Grit	100	LF	$75	1.00	$7,500
	Valves	3	EA	$1,050	1.20	$3,780
	Plumbing	1	LS	$5,000	1.00	$5,000
						$254,155
3	**Influent Pumping**					
	Demolition					
	Pump removal	4	EA	$1,500	1.00	$6,000
	HVAC removal incl screening area	612	SF	$10	1.00	$6,120
	Plumbing removal	1	LS	$1,500	1.00	$1,500
	Equipment Install					
	High Capacity Pumps	0	EA	$27,500	1.25	$0
	Low Capacity Pumps	4	EA	$22,500	1.25	$112,500
	Piping and Valves - Interior					
	Main Discharge Piping	75	LF	$200	1.00	$15,000
	Bypass	30	LF	$200	1.00	$6,000
	Actuated valves	2	EA	$7,500	1.00	$15,000
	Process valves	8	EA	$1,500	1.00	$12,000
	HVAC	612	SF	$75	1.00	$45,900
	Painting					
	Building surfaces	1,595	SF	$8	1.00	$12,760
	Equipment	4	EA	$1,250	1.00	$5,000
	Pipe surfaces	280	SF	$10	1.00	$2,800
						$240,580
4	**Equalization Tank**					
	Equipment					
	Submersible pumps	2	EA	$12,500	1.25	$31,250
	Piping and Valves					
	Valves	6	EA	$1,250	1.00	$7,500
	Blower piping	75	LF	$100	1.00	$7,500
	Painting					
	Equipment	2	EA	$1,000	1.00	$2,000
						$48,250
5	**Primary Clarifiers**					
5A	***Demolition***					
	Mechanism Removal	2	EA	$9,500	1.00	$19,000
	Concrete	120	CY	$100	1.00	$12,000
						$31,000
5B	***Upgrades to Existing***					
	Equipment					
	Skimmers		EA	$2,250	1.20	$0
	Baffles		LS	$1,200	1.20	$0
	Weirs		LS	$1,200	1.20	$0
	Piping and Valves					
	Piping Modifications		LS		1.00	$0
	Non-actuated valves		EA	$1,250	1.00	$0
	Actuated valves - add actuators		EA	$1,500	1.00	$0
	Flume Building					
	Flow Control Valve		EA	$5,000	1.00	$0
	HVAC Modifications		SF	$50	1.00	$0
	Painting					
	Structure		SF	$6	1.00	$0
	Equipment		EA	$500	1.00	$0
	Pipes		SF	$10	1.00	$0
						$0
6	**Splitter/Selectors**					
	Excavation	77	CY	$30	1.00	$2,310
	Rock Excavation	650	CY	$100	1.00	$65,000

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		Quantity	Units	Unit Cost	Install Factor	Total Cost
	Concrete					
	Structural fill	45	CY	$30	1.00	$1,350
	Slab on soil	35	CY	$400	1.00	$14,000
	Shored slab	10	CY	$1,100	1.00	$11,000
	Straight walls	115	CY	$750	1.00	$86,250
	Concrete fill		CY	$400	1.00	$0
	Misc concrete	10	CY	$750	1.00	$7,500
	Stairs and railings	160	LF	$75	1.00	$12,000
	Miscellaneous metals	1	LS	$10,000	1.00	$10,000
	Equipment Installation					
	Submersible mixers	4	EA	$7,500	1.25	$37,500
	Recycle pump	1	EA	$5,000	1.25	$6,250
	Piping and Valves					
	10" Influent	50	LF	$125	1.00	$6,250
	6" Drain	50	LF	$100	1.00	$5,000
	15" Bypass	40	LF	$150	1.00	$6,000
	6" RAS	90	LF	$125	1.00	$11,250
	8" Air	20	LF	$75	1.00	$1,500
	12" Aeration Basin Influent	50	LF	$150	1.00	$7,500
	4" Recycle	130	LF	$75	1.00	$9,750
	Non-actuated valves	12	EA	$1,250	1.00	$15,000
	Process gates	8	EA	$3,500	1.20	$33,600
	Piping and Valves-Yard					
	10" Influent	50	LF	$225	1.20	$13,500
	10" Effluent	150	LF	$225	1.20	$40,500
	Non-actuated valves	5	EA	$1,250	1.20	$7,500
	Painting					
	Pipes	100	SF	$10	1.00	$1,000
						$411,510
7	**Secondary Treatment**					
7A	***Demolition of RBC Units***					
	RBC Shaft and Media Removal	8	EA	$2,500	1.00	$20,000
	Concrete	285	CY	$100	1.00	$28,500
	Other Equipment	1	LS	$2,000	1.00	$2,000
	Electrical	1	LS	$2,500	1.00	$2,500
						$53,000
7B	***Upgrades to Existing RBCs***					
	Structural modifications		LS	$5,000	1.00	$0
	Equipment					
	Media and Shafts - Standard		EA	$88,000	1.15	$0
	Media and Shafts - High		EA	$135,000	1.15	$0
	Covers		EA	$12,000	1.10	$0
	Baffles		LS	$5,000	1.00	$0
	Diffusers		SF	$15	1.00	$0
	Blowers		EA	$15,000	1.00	$0
	Piping and Valves					
	Piping Modifications		LS		1.00	$0
	Non-actuated valves		EA	$1,250	1.20	$0
	Actuated valves		EA	$1,500	1.20	$0
						$0
7C	***New RBC Train***					
	Excavation		CY	$30	1.00	$0
	Rock Excavation		CY	$100	1.00	$0
	Concrete					
	Structural fill		CY	$25	1.00	$0
	Slab on soil		CY	$450	1.00	$0
	Straight walls		CY	$675	1.00	$0
	Misc concrete		CY	$500	1.00	$0
	Stairs and railings		LF	$75	1.00	$0
	Miscellaneous metals		LS	$10,000	1.00	$0
	Grating		SF	$50	1.00	$0
	Equipment Install					
	Media and Shafts - Standard		EA	$88,000	1.25	$0
	Media and Shafts - High		EA	$135,000	1.25	$0
	Covers		EA	$12,000	1.25	$0
	Baffles		LS	$2,500	1.25	$0
	Diffusers		SF	$15	1.25	$0
	Piping, Valves and Gates					
	Influent piping		LF	$200	1.00	$0
	Effluent piping		LF	$200	1.00	$0
	Bypass piping		LF	$200	1.00	$0
	Manual valves		EA	$1,250	1.00	$0
	Automated valves		EA	$1,500	1.20	$0
	Process gates		EA	$3,500	1.20	$0
	Painting					

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		Quantity	Units	Unit Cost	Install Factor	Total Cost
	Structure surfaces		SF	$5	1.00	$0
	Pipes		SF	$10	1.00	$0
	Equipment		EA	$250	1.00	$0
						$0
7D	***New Aeration Basins***					
	Excavation	119	CY	$30	1.00	$3,567
	Rock Excavation	2,083	CY	$100	1.00	$208,280
	Concrete					
	Structural fill	88	CY	$25	1.00	$2,200
	Slab on soil	131	CY	$450	1.00	$59,040
	Straight walls	271	CY	$675	1.00	$182,952
	Misc concrete	10	CY	$500	1.00	$5,000
	Miscellaneous metals	1	LS	$10,000	1.00	$10,000
	Grating	101	SF	$50	1.00	$5,050
	Railings	240	LF	$75	1.00	$18,000
	Stairs	10	LF	$175	1.00	$1,750
	Equipment Install					
	Diffusers	1,430	SF	$25	1.25	$44,688
	Piping and Gates					
	Influent piping	40	LF	$200	1.00	$8,000
	Effluent piping	50	LF	$200	1.00	$10,000
	Bypass piping	58	LF	$125	1.00	$7,250
	Aeration piping	48	LF	$200	1.00	$9,600
	Manual valves	3	EA	$1,250	1.00	$3,750
	Automated valves	2	EA	$1,500	1.20	$3,600
	Process gates	3	EA	$3,500	1.20	$12,600
	Piping and Valves -Yard					
	10" Influent	50	LF	$200	1.00	$10,000
	10" Effluent	50	LF	$200	1.00	$10,000
	6" RAS	300	LF	$125	1.00	$37,500
	4" WAS	110	LF	$100	1.00	$11,000
	6" Primary	240	LF	$125	1.00	$30,000
	10" Aeration piping	120	LF	$200	1.00	$24,000
	Manual valves	5	EA	$3,500	1.20	$21,000
	Painting					
	Structure surfaces		SF	$5	1.00	$0
	Pipes	100	SF	$10	1.00	$1,000
	Equipment		EA	$15,000	1.00	$0
						$739,827
8	**Process Building (Blowers/RAS/WAS)**					
	New Building Construction					
	Excavation	153	CY	$30	1.00	$4,590
	Rock Excavation	675	CY	$100	1.00	$67,500
	Concrete					
	Structural fill	262	CY	$25	1.00	$6,550
	Circular walls	0	CY	$675	1.00	$0
	Straight walls	50	CY	$600	1.00	$30,000
	Slab on soil	108	CY	$400	1.00	$43,200
	Shored slab	4	CY	$1,100	1.00	$4,400
	Shored beams	0	CY	$1,700	1.00	$0
	Columns	0	CY	$1,150	1.00	$0
	Concrete fill	10	CY	$400	1.00	$4,000
	Misc concrete	5	CY	$750	1.00	$3,750
	Block walls - split face	1990	SF	$30	1.00	$59,700
	Block wall - plain	750	SF	$20	1.00	$15,000
	Concrete plank	2400	SF	$15	1.00	$36,000
	Roofing	2400	SF	$20	1.00	$48,000
	Architectural	2400	SF	$20	1.00	$48,000
	Stairs and railings	25	LF	$200	1.00	$5,000
	Miscellaneous metals	1	LS	$5,000	1.00	$5,000
	Equipment Installation					
	Aeration blowers	3	EA	$22,500	1.20	$81,000
	RAS/WAS pumps	4	EA	$16,000	1.20	$76,800
	Piping and Valves - Interior					
	10" Air	150	LF	$125	1.00	$18,750
	8" RAS	80	LF	$100	1.00	$8,000
	4" WAS	40	LF	$90	1.00	$3,600
	Manual valves - Air	10	EA	$650	1.00	$6,500
	Automated valves - Air	3	EA	$3,500	1.20	$12,600
	Automated valves - RAS/WAS	20	EA	$3,500	1.20	$84,000
	Painting					
	Room	6250	SF	$5	1.00	$31,250
	Equipment	7	EA	$500	1.00	$3,500
	Pipes	1000	SF	$10	1.00	$10,000
	HVAC	2400	SF	$30	1.00	$72,000

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	Plumbing	2400	SF	$10	1.00	$24,000
						$812,690
9	**Chemical Feed**					
	Tuckpointing/Exterior Repairs	1	LS	$7,500	1.00	$7,500
	Equipment					
	Chemical Feed Pumps	3	EA	$3,500	1.25	$13,125
	Chemical Storage Tanks	2	EA	$2,500	1.25	$6,250
	Process Piping					
	3" PVC Carrier	150	LF	$40	1.00	$6,000
	Chemical Feed Tubing	300	LF	$15	1.00	$4,500
	Valves	3	EA	$175	1.00	$525
	Plumbing	400	SF	$15	1.00	$6,000
	Painting - Structure	800	SF	$5	1.00	$4,000
	HVAC	400	SF	$50	1.00	$20,000
						$67,900
10	**Final Clarifiers**					
10A	***Construction - Third Clarifier***					
	Excavation	46	CY	$30	1.00	$1,380
	Rock Excavation	789	CY	$100	1.00	$78,900
	Structural fill		CY	$20	1.00	$0
	Circular walls	57	CY	$675	1.00	$38,475
	Straight walls		CY	$600	1.00	$0
	Slab on soil	45	CY	$400	1.00	$18,000
	Shored slab		CY	$1,100	1.00	$0
	Shored beams		CY	$1,700	1.00	$0
	Columns		CY	$1,150	1.00	$0
	Concrete fill		CY	$400	1.00	$0
	Misc concrete		CY	$750	1.00	$0
	Stairs and railings	93	LF	$75	1.00	$6,975
	Hatchways		EA	$1,000	1.00	$0
	Miscellaneous metals	1	LS	$10,000	1.00	$10,000
	Equipment					
	Clarifier Mechanism	1	EA	$100,000	1.20	$120,000
	Weirs and baffles	1	EA	$7,500	1.20	$9,000
	Aluminum covers	1	EA	$50,000	1.25	$62,500
	Piping and Valves - Interior					
	10" Influent	14	LF	$200	1.00	$2,800
	Effluent	5	LF	$200	1.00	$1,000
	6" Sludge	24	LF	$100	1.00	$2,400
	6" Scum	22	LF	$100	1.00	$2,200
	Non-actuated valves	2	EA	$650	1.00	$1,300
	Actuated valves	1	EA	$3,000	1.20	$3,600
	Process gates	1	EA	$3,500	1.20	$4,200
	Piping and Valves-Yard					
	10" Influent	30		$225	1.00	$6,750
	10" Effluent	10		$225	1.00	$2,250
	6" RAS	70		$125	1.00	$8,750
	Painting					
	Structure surfaces		SF	$5	1.00	$0
	Pipes	100	SF	$10	1.00	$1,000
	Equipment	1	EA	$30,000	1.00	$30,000
						$411,480
10B	***Upgrades - Existing Clarifiers***					
	Demolition - Scraper Removal	2	EA	$0	1.00	$0
	Scraper assemblies	2	EA	$0	1.20	$0
	Drive Replacement	0	EA	$0	1.20	$0
	Stuctural - Baffles	1	LS	$0	1.00	$0
	Piping Modifications	1	LS	$0	1.00	$0
						$0
11	**Tertiary Filtration**					
11A	***Demolition of Existing Filter***					
	Demolition					
	Blower removal	2	EA	$1,250	1.00	$2,500
	Pump removal	2	EA	$1,000	1.00	$2,000
	Media removal	1,092	CF	$10	1.00	$10,920
	Media disposal	40	CY	$75	1.00	$3,000
	Torch superstructure	1	LS	$7,500	1.00	$7,500
	Remove metal	1	LS	$5,000	1.00	$5,000
	Electrical	1	LS	$5,000	1.00	$5,000
	Piping	200	LF	$30	1.00	$6,000
	Room Rehab					
	Concrete/masonry repair	1	LS	$2,500	1.00	$2,500
	Painting	2,750	SF	$6	1.00	$16,500
						$60,920

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11B Construction of New Filter					
Construction					
Concrete		CY	$650	1.00	$0
Misc Metals		LS	$5,000	1.00	$0
Filter Supports		EA	$5,000	1.00	$0
Temporary Wall Opening		LS	$15,000	1.00	$0
Equipment					
Filter System		EA	$220,000	1.10	$0
Flash Mixer		EA	$5,000	1.20	$0
Floc Tank Mixer		EA	$7,500	1.20	$0
Polymer System		EA	$12,000	1.20	$0
Piping and Valves - Interior					
Effluent		LF	$200	1.00	$0
Process Drain		LF	$80	1.00	$0
Backwash		LF	$50	1.00	$0
Polymer Feed		LF	$25	1.00	$0
Valves		EA	$2,500	1.00	$0
Painting					
Pipes		SF	$10	1.00	$0
HVAC		SF	$50	1.00	$0
					$0
12 Solids Handling/Thickening					
New Building Construction - Phase 3					
Construction					
Excavation	63	CY	$30	1.00	$1,890
Rock Excavation	657	CY	$100	1.00	$65,700
Structural Fill		CY	$25	1.00	$0
Footings	15	CY	$400	1.00	$6,000
Slab on soil	20	CY	$550	1.00	$11,000
Foundation walls	25	CY	$650	1.00	$16,250
Stoops	5	CY	$750	1.00	$3,750
Block wall - split face	1,300	SF	$35	1.00	$45,500
Concrete planking	750	SF	$18	1.00	$13,125
Roofing	750	SF	$22	1.00	$16,500
Architectural	750	SF	$20	1.00	$15,000
Stairs	12	LF	$150	1.25	$2,250
Railings	32	LF	$50	1.25	$2,000
Equipment					
DAF Feed Pumps	2	EA	$17,500	1.25	$43,750
Polymer System	1	EA	$14,000	1.30	$18,200
Polymer spare parts	1	LS	$5,000	1.00	$5,000
DAF Thickener	1	EA	$225,000	1.15	$258,750
TWAS Pumps	2	EA	$17,500	1.25	$43,750
Beam and hoist	1	EA	$12,500	1.25	$15,625
Piping and Valves - Interior					
Sludge Feed	100	LF	$100	1.00	$10,000
Process Drain	100	LF	$100	1.00	$10,000
TWAS	125	LF	$100	1.00	$12,500
Polymer Feed	30	LF	$25	1.00	$750
Valves	6	EA	$900	1.00	$5,400
Piping and Valves - Yard					
6" Primary Sludge Feed	120	LF	$100	1.00	$12,000
10" Digester	70	LF	$225	1.00	$15,750
Painting					
Structure surfaces	2500	SF	$5	1.00	$12,500
Pipes	250	SF	$10	1.00	$2,500
Equipment	4	EA	$500	1.00	$2,000
HVAC	750	SF	$50	1.00	$37,500
Plumbing	750	SF	$15	1.00	$11,250
					$716,190
13 Digester Complex					
13A Rehab of Existing Anaerobic Digester					
Demolition					
Boiler/Heat Xchgr		LS	$4,000	1.00	$0
Gas train		LS	$4,000	1.00	$0
Digester mixing system		EA	$1,500	1.00	$0
Equipment Install					
Boiler/Heat Xchgr		EA	$150,000	1.10	$0
Gas train		EA	$75,000	1.15	$0
Digester mixing system		EA	$75,000	1.20	$0
Primary sludge pumps		EA	$22,500	1.20	$0
Sludge recirculation pumps		EA	$17,500	1.20	$0
Cover Rehab/Replacement					
Cover Rehab		EA	$75,000	1.15	$0
Painting Cover		LS	$45,000	1.00	$0

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	Tuckpointing/Exterior Repairs		LS	$7,500	1.00	$0
	Existing Roof Modifications		LS	$1,500	1.00	$0
	Process Piping					
	Sludge Feed		LF	$100	1.00	$0
	Valves		EA	$950	1.00	$0
	Construction - Gas Handling Room					
	Excavation		CY	$30	1.00	$0
	Structural Fill		CY	$25	1.00	$0
	Footings		CY	$400	1.00	$0
	Slab on soil		CY	$550	1.00	$0
	Foundation walls		CY	$650	1.00	$0
	Stoops		CY	$750	1.00	$0
	Block wall - split face		SF	$35	1.00	$0
	Concrete planking		SF	$18	1.00	$0
	Roofing		SF	$22	1.00	$0
	Architectural		SF	$20	1.00	$0
	Stairs		LF	$225	1.25	$0
	Railings		LF	$50	1.25	$0
	Painting					
	Structure surfaces		SF	$8	1.00	$0
	Pipes		SF	$10	1.00	$0
	Equipment		EA	$125	1.00	$0
	HVAC		SF	$75	1.00	$0
	Plumbing		SF	$15	1.00	$0
	Interim Sludge Processing		LS	$150,000	1.00	$0
						$0
13B	***Conversion to Aerobic Digestion***					
	Demolition					
	Boiler/Heat Xchgr	1	LS	$4,000	1.00	$4,000
	Piping	106	LF	$25	1.00	$2,650
	Gas train	1	LS	$4,000	1.00	$4,000
	Digester mixing system	1	EA	$2,500	1.00	$2,500
	Cover removal	1	LS	$17,500	1.00	$17,500
	Structural Modifications	1	LS	$7,500	1.00	$7,500
	Tuckpointing/Exterior Repairs	1	LS	$7,500	1.00	$7,500
	Equipment Install					
	Blowers	2	EA	$30,000	1.20	$72,000
	Diffusers	1,590	SF	$30	1.20	$57,240
	Cover	1	EA	$75,000	1.20	$90,000
	Sludge Pumps	2	EA	$17,500	1.20	$42,000
	Piping and Valves					
	Sludge Feed	100	LF	$100	1.00	$10,000
	Air Piping	80	LF	$100	1.00	$8,000
	Valves	15	EA	$950	1.00	$14,250
	Plumbing	270	SF	$15	1.00	$4,050
	HVAC	270	SF	$75	1.00	$20,250
	Painting					
	Structure surfaces	700	SF	$5	1.00	$3,500
	Pipes	250	SF	$10	1.00	$2,500
	Equipment	5	EA	$125	1.00	$625
						$370,065
14	**Sludge Storage**					
	No Modifications Planned					
						$0
15	**Waste Receiving Station**					
	Construction					
	Excavation	48	CY	$30	1.00	$1,440
	Rock Excavation	337	CY	$100	1.00	$33,700
	Structural Fill	60	CY	$25	1.00	$1,500
	Straight walls	85	CY	$675	1.00	$57,375
	Slab on grade	40	CY	$450	1.00	$18,000
	Shored slab	40	CY	$1,100	1.00	$44,000
	Concrete Fill	15	CY	$500	1.00	$7,500
	Misc concrete	10	CY	$500	1.00	$5,000
	Stairs and railings	0	EA	$75	1.00	$0
	Access hatches	5	EA	$1,250	1.20	$7,500
	Equipment					
	Bar Rack	1	EA	$14,000	1.30	$18,200
	Screening	0	EA	$225,000	1.15	$0
	Submersible pumps	2	EA	$7,500	1.25	$18,750
	Diffusers	8	EA	$200	1.25	$2,000
	Blower	1	EA	$5,000	1.25	$6,250
	Sound Enclosure	1	EA	$3,000	1.25	$3,750
	Mechanical gates	2	EA	$3,750	1.20	$9,000
	Piping					

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2" Air	50	LF	$75	1.00	$3,750
4" Septage to Headworks	200	LF	$100	1.00	$20,000
4" Septage to Digester	100	LF	$100	1.00	$10,000
6" Drain To Headworks	200	LF	$100	1.00	$20,000
Valves	6	EA	$900	1.00	$5,400
					$293,115
16 Lab/Process Building					
Demolition					
Lab cabinets and equip removal	1	LS	$4,500	1.00	$4,500
HVAC	1	LS	$4,500	1.00	$4,500
Bathroom fixtures	1	LS	$2,250	1.00	$2,250
Partition walls	60	SF	$25	1.00	$1,500
Ceiling	100	SF	$20	1.00	$2,000
Expanded Bathroom					
New fixtures	1	LS	$3,500	1.00	$3,500
New door	1	EA	$750	1.20	$900
New wall treatment	100	SF	$10	1.00	$1,000
Floor	80	SF	$20	1.00	$1,600
New ceiling	80	SF	$12	1.00	$960
Plumbing	142	SF	$12	1.00	$1,704
Lab Upgrade					
New wall	120	SF	$15	1.00	$1,800
New ceiling	270	SF	$10	1.00	$2,700
New cabinets	1	LS	$25,000	1.00	$25,000
Lab equipment allowance	1	LS	$15,000	1.00	$15,000
Windows and Doors	1	LS	$8,000	1.00	$8,000
Painting	528	SF	$8	1.00	$4,224
Flooring	270	SF	$10	1.00	$2,700
Building Roofing	2240	SF	$7.50	1.00	$16,800
Plumbing	1000	SF	$20.00	1.00	$20,000
HVAC	1000	SF	$50.00	1.00	$50,000
					$170,638
17 Garage					
17A Modify Existing Garage					
HVAC	1728	SF	$35	1.00	$60,480
Insulation	2352	SF	$7	1.00	$16,464
					$76,944
17B New Construction					
Excavation	100	CY	$30	1.00	$3,000
Rock Excavation	500	CY	$30	1.00	$15,000
Structural fill	100	CY	$25	1.00	$2,500
Circular walls	0	CY	$675	1.00	$0
Straight walls	34	CY	$600	1.00	$20,400
Slab on soil	85	CY	$400	1.00	$34,000
Shored slab	0	CY	$1,100	1.00	$0
Shored beams	0	CY	$1,700	1.00	$0
Columns	5	CY	$1,150	1.00	$5,750
Concrete fill	5	CY	$400	1.00	$2,000
Misc concrete	5	SF	$750	1.00	$3,750
Block walls - split face	2,310	SF	$30	1.00	$69,300
Block wall - plain	0	SF	$20	1.00	$0
Concrete plank	416	SF	$15	1.00	$6,240
FRP laminated ceiling	1,600	SF	$8	1.00	$12,000
Roofing	1,600	SF	$20	1.00	$32,000
Architectural	1,600	LF	$20	1.00	$32,000
Stairs and railings	100	LF	$75	1.00	$7,500
Equipment Installation					
Welder	1	LS	$2,500	1.20	$3,000
High pressure washer	1	EA	$1,000	1.20	$1,200
Valves	0	LF	$1,500	1.00	$0
Painting					
Pipes	0	EA	$5	1.00	$0
HVAC	1,600	SF	$20	1.00	$32,000
Plumbing	1,600	LS	$10	1.00	$16,000
					$297,640

Appendix Q

Funding and User Charge Calculations

City of Fennimore
WWTP Facilities Planning
Wastewater Equivalent Meters - 2014

Meter Size	Meter Equivalent	Residential	Commercial	Industrial	Public Authority	Total Meter Count	Equivalent Meters
5/8"	1.0	976	92	1	37	1,106	1,106
3/4"	1.0	1				1	1
1"	2.5		21		5	26	65
1-1/4"	3.5					0	0
1-1/2"	5.0		8		11	19	95
2"	8.0		3	1	9	13	104
3"	15.0				1	1	15
4"	25.0			1		1	25
Rural Residential	1.0	8				8	8
Rural Commercial	1.0		4			4	4
Sewer Only/Metered Sewer- 5/8"	1.0		3			3	3
		985	131	3	63	1,182	1,426

2014 Total Billed Sewer Flow	57,759,000
Flow Per Equivalent Meter	3375
Total Residential Flow	36,295,612
Total Residential Users	985
Flow per Residential User/Month	3071

Current Fixed Charge	Current Multiplier	2009 Multiplier	Current Equivalent Meters
$15.32	1	1	1106
$15.32	1	1	1
$29.14	1.9	2	49
$56.78	3.7	4	0
$84.41	5.5	6	105
$139.69	9.1	10	119
$305.51	19.9	22	20
$498.98	32.6	36	33
			8
			4
			3
			1447

2014 Total Billed Sewer Flow	57,759,000
Flow Per Equivalent Meter	3326

City of Fennimore Sewer Utility
User Rate Alternatives - No Filter for Phase 2
8/20/2015

Alt.	Description	Assumptions	2015	2016	2017	2018	2019	2020	2021	2022	Comments
Fixed rates for all alternatives											
	Fixed Rate-Cost per equivalent user per month		$15.32	$20.00	$20.00	$20.00	$29.00	$29.00	$29.00	$29.00	
A1	Average Variable Rate per month		4.83	9.50	9.50	9.50	12.50	14.00	14.00	15.00	
	Average Monthly residential rate based on 3,071 gallons per month	Assumes CWF funding, annual budget for future projects	**30.15**	**49.17**	**49.17**	**49.17**	**67.39**	**71.99**	**71.99**	**75.07**	
B1	Average Variable Rate per month		$4.83	$7.00	$7.00	$8.00	$8.00	$8.00	$9.00	$9.00	
	Average Monthly residential rate based on 3,071 gallons per month	Assumes Rural Development Load and Grant funding, annual budget for future projects	**$30.15**	**$41.50**	**$41.50**	**$44.57**	**$53.57**	**$53.57**	**$56.64**	**$56.64**	
B2	Average Variable Rate per month		$4.83	$8.00	$8.00	$8.00	$9.50	$9.50	$11.00	$11.00	
	Average Monthly residential rate based on 3,071 gallons per month	Assumes Rural Development Loan and Grant funding based on 25 year payback, annual budget for future projects	**$30.15**	**$44.57**	**$44.57**	**$44.57**	**$58.17**	**$58.17**	**$62.78**	**$62.78**	

Assumptions
- A1 assumes CWF for all projects
- B1 and B2 assume Rural Development for Phase 1, CWF for Phase 2
- Phase 2, $500,000 was used for the UV replacement and cost for the future phosphorus is not included, hopefully not needed
- Phase 2 - Increased Phosphorus Removal starts in 2021
  - No filter installation, includes costs for Statewide Variance at approximately $25,000 per year
- No cost included for phase 3
- Assumes annually budget for future sewer collection system projects
- All alternatives includes all existing debt
- Vac/Jet Truck and Office/Software/ Computer upgrades funded from replacement fund and cash reserves
- Operation costs and collection system replacement costs are increased annually by 3%
- CWF loan is a 20 year loan (A1) and the Rural Development loan (B1 and B2) is a 40 year loan but can be prepaid anytime (B2 is 25 years)
- 2.75% loan interest is assumed for CWF and 3% is assumed for Rural Development
- MHI = $45,449, 2% of MHI = $909/yr, $75.75/month

CITY OF FENNIMORE SEWER UTILITY
WASTEWATER BUDGET AND REVENUE PROJECTIONS
USING CLEAN WATER FUND LOAN ONLY, NO FILTER

8/20/2015

ASSUMPTIONS

EXISTING DEBTS		Ann Payment	Ends						
Lincoln Ave Project		$ 24,389	Dec 2015						
Final Payment		$ 40,370	June 2016						
							Ann. % Incr.		
WWTP ANNUAL O&M COSTS (includes taxes)	$ 385,400	Existing plant		$412,400	New plant		3%		
WWTP ANNUAL REPLACEMENT FUND COSTS	$ 80,000	Existing plant		$81,200	New plant				
ANNUAL COLLECTION SYSTEM IMPROVEMENTS	$ 25,000						3%		
PHOSPHORUS O&M COSTS				$ 25,000					
PHOSPHORUS REPLACEMENT FUND COSTS									
INTEREST INCOME RATE ASSUMED	0.5%								
OTHER INCOME ANNUAL INCREASE	0%								
FACILITIES UPGRADES	Capital Costs	Grant $	Net Cost	Interest Rate	Payback Yrs	Rate Factor	Yearly Paymt	Year	
Wastewater Treatment Facility Upgrade - Phase 1 and LS SCADA	$8,650,000	$0	$8,650,000	2.750%	19	0.0683	$590,605	2017	
Phase 2 - Increased Phosphorus Removal		$0	$0	2.750%	19	0.0683	$0	2021	
Phase 3 - Additional Capacity		$0	$0	3.000%	19	0.0698	$0	2027	
Other Projects		$0	$0	3.250%	19	0.0714	$0		
UNRESTRICTED CASH AND EQUIVALENTS AVAILABLE-12-31-2014	$ 560,134								
REPLACEMENT FUND AS OF 12-31-2014	$ 1,009,101								

Assumptions Notes:
Assumes CWF for all projects, 20 year loans
Includes all existing debt
Phase 2 - Increased Phosphorus Removal starts in 2021
No filter installation, includes costs for Statewide Variance at approximately $25,000 per year
No costs included for Phase 3
Vac Truck funded from Replacement Fund
Operation costs and collection system replacement costs are increased annually by 3%
MHI = $45,449, 2% of MHI = $909/yr, $75.75/month
Annual carryover goal is $300,000 (25% of expenses)

BUDGET ITEM	2014	2015	2016	2017	2018	2019	2020	2021	2022
EXPENSES									
Existing Loans	$ 24,389	$ 24,389	$ 40,370						
Annual Operation and Maintenance Costs	$ 385,400	$ 385,400	$ 396,962	$ 412,400	$ 424,772	$ 437,515	$ 450,641	$ 464,160	$ 478,085
Phosphorus Operation and Maintenance Costs								$ 25,000	$ 25,000
WWTP Replacement Fund Deposit	$ 70,000	$ 80,000	$ 80,000	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200
Phosphorus Replacement Fund Deposit								$ -	$ -
Annual Collection System Improvements Fund	$ 25,000	$ 25,000	$ 25,000	$ 25,750	$ 26,523	$ 27,318	$ 28,138	$ 28,982	$ 29,851
Estimated Outside Services Costs - Facilities Upgrade		$ 50,000	$ 600,000	$ 50,000	$ -	$ -	$ -	$ -	$ -
New WWTF Upgrade Loan Debt				$ 190,300	$ 590,605	$ 590,605	$ 590,605	$ 590,605	$ 590,605
Phase 2 Debt								$ -	$ -
Phase 3 Debt									
Vac/Jet Truck - From Replacement Fund				$ 100,000					
Software/Computers/Copier - From Replacement Fund			$ 5,000	$ 10,000			$ 5,000		
Washington Street Sewer				$ 180,000					
Future projects - Collection System			$ 100,000	$ 68,750	$ 110,000	$ 87,500	$ 100,000	$ 100,000	$ 100,000
TOTAL ANNUAL EXPENSES	**$ 504,789**	**$ 564,789**	**$ 1,247,332**	**$ 1,118,400**	**$ 1,233,099**	**$ 1,224,138**	**$ 1,255,583**	**$ 1,289,947**	**$ 1,304,741**
REVENUES									
User Charge Revenues	$ 515,652	$ 527,183	$ 863,515	$ 863,515	$ 863,515	$ 1,182,136	$ 1,264,443	$ 1,264,443	$ 1,319,314
CWF Reimbursement of Outside Services/Engineering				$ 700,000					
Cash from Replacement Fund			$ 5,000	$ 110,000			$ 5,000		
Use of Cash on Hand	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauled Waste/Other Revenues	$ 1,750	$ 2,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Income	$ 1,405	$ 2,801	$ 2,640	$ 759	$ 3,538	$ 1,708	$ 1,506	$ 1,583	$ 1,464
TOTAL ACTUAL ANNUAL REVENUE	**$ 518,807**	**$ 532,584**	**$ 871,155**	**$ 1,674,274**	**$ 867,053**	**$ 1,183,844**	**$ 1,270,949**	**$ 1,266,026**	**$ 1,320,777**
EXCESS REVENUE FOR THIS FISCAL YEAR	$ 14,018	$ (32,206)	$ (376,177)	$ 555,874	$ (366,046)	$ (40,294)	$ 15,366	$ (23,921)	$ 16,037
CARRYOVER FROM PREVIOUS YEAR		$ 560,134	$ 527,928	$ 151,751	$ 707,625	$ 341,579	$ 301,284	$ 316,650	$ 292,730
TOTAL AVAILABLE CARRYOVER	**$ 560,134**	**$ 527,928**	**$ 151,751**	**$ 707,625**	**$ 341,579**	**$ 301,284**	**$ 316,650**	**$ 292,730**	**$ 308,766**
REVENUE DETAILS									
Equivalent Meters Added Per Year	0								
Monthly Usage per Equivalent Meter (gallons)	3,071								
Estimated Number of Equivalent Meters	1426	1426	1426	1426	1426	1426	1426	1426	1426
Estimated Annual Water Usage (gallons) (95% of 2014 Flows)	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050
ESTIMATED MONTHLY USER CHARGES									
Fixed Charges on Debt									
Actual Monthly Fixed Charge per Equivalent Meter Implemented	$ 13.82	$ 15.32	$ 20.00	$ 20.00	$ 20.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00
Actual Annual Fixed Charge Revenue Generated	$ 236,488	$ 262,156	$ 342,240	$ 342,240	$ 342,240	$ 496,248	$ 496,248	$ 496,248	$ 496,248
Variable Charges - O, M & R Costs (Cost per 1000 gallons)									
Actual Variable Charge per 1000 Gallons Implemented	$ 4.33	$ 4.83	$ 9.50	$ 9.50	$ 9.50	$ 12.50	$ 14.00	$ 14.00	$ 15.00
Actual Annual Variable Charge Revenue Generated	$ 237,592	$ 265,027	$ 521,275	$ 521,275	$ 521,275	$ 685,888	$ 768,195	$ 768,195	$ 823,066
TOTAL ACTUAL MONTHLY USER CHARGE PER RESIDENTIAL USER	**$ 27.12**	**$ 30.15**	**$ 49.17**	**$ 49.17**	**$ 49.17**	**$ 67.39**	**$ 71.99**	**$ 71.99**	**$ 75.07**
REVENUE GENERATED BY RATES	**$ 474,079**	**$ 527,183**	**$ 863,515**	**$ 863,515**	**$ 863,515**	**$ 1,182,136**	**$ 1,264,443**	**$ 1,264,443**	**$ 1,319,314**
Replacement Fund - Can be used to offset costs	$ 1,009,101	$ 1,089,101	$ 1,164,101	$ 1,135,301	$ 1,216,501	$ 1,297,701	$ 1,373,901	$ 1,455,101	$ 1,536,301

BUDGET ITEM	2023	2024	2025	2026	2027	2028	2029	2030
EXPENSES								
Existing Loans								
Annual Operation and Maintenance Costs	$ 492,427	$ 507,200	$ 522,416	$ 538,088	$ 554,231	$ 570,858	$ 587,984	$ 605,623
Phosphorus Operation and Maintenance Costs	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
WWTP Replacement Fund Deposit	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200
Phosphorus Replacement Fund Deposit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Collection System Improvements Fund	$ 30,747	$ 31,669	$ 32,619	$ 33,598	$ 34,606	$ 35,644	$ 36,713	$ 37,815
Estimated Outside Services Costs - Facilities Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
New WWTF Upgrade Loan Debt	$ 590,605	$ 590,605	$ 590,605	$ 590,605	$ 590,605	$ 590,605	$ 590,605	$ 590,605
Phase 2 Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Phase 3 Debt					$ -	$ -	$ -	$ -
Vac/Jet Truck - From Replacement Fund								
Software/Computers/Copier - From Replacement Fund								
Washington Street Sewer								
Future projects - Collection System	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
TOTAL ANNUAL EXPENSES	**$ 1,319,979**	**$ 1,335,674**	**$ 1,351,840**	**$ 1,368,491**	**$ 1,385,642**	**$ 1,403,307**	**$ 1,421,502**	**$ 1,440,243**
REVENUES								
User Charge Revenues	$ 1,319,314	$ 1,319,314	$ 1,374,185	$ 1,374,185	$ 1,374,185	$ 1,429,056	$ 1,429,056	$ 1,429,056
CWF Reimbursement of Outside Services/Engineering								
Cash from Replacement Fund								
Use of Cash on Hand	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauled Waste/Other Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Income	$ 1,544	$ 1,548	$ 1,474	$ 1,593	$ 1,630	$ 1,581	$ 1,717	$ 1,764
TOTAL ACTUAL ANNUAL REVENUE	**$ 1,320,858**	**$ 1,320,862**	**$ 1,375,659**	**$ 1,375,778**	**$ 1,375,814**	**$ 1,430,636**	**$ 1,430,773**	**$ 1,430,819**
EXCESS REVENUE FOR THIS FISCAL YEAR	$ 879	$ (14,812)	$ 23,819	$ 7,287	$ (9,827)	$ 27,329	$ 9,271	$ (9,424)
CARRYOVER FROM PREVIOUS YEAR	$ 308,766	$ 309,645	$ 294,833	$ 318,652	$ 325,938	$ 316,111	$ 343,440	$ 352,711
TOTAL AVAILABLE CARRYOVER	**$ 309,645**	**$ 294,833**	**$ 318,652**	**$ 325,938**	**$ 316,111**	**$ 343,440**	**$ 352,711**	**$ 343,288**
REVENUE DETAILS								
Equivalent Meters Added Per Year								
Monthly Usage per Equivalent Meter (gallons)								
Estimated Number of Equivalent Meters	1426	1426	1426	1426	1426	1426	1426	1426
Estimated Annual Water Usage (gallons) (95% of 2014 Flows)	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050
ESTIMATED MONTHLY USER CHARGES								
Fixed Charges on Debt								
Actual Monthly Fixed Charge per Equivalent Meter Implemented	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00
Actual Annual Fixed Charge Revenue Generated	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248
Variable Charges - O, M & R Costs (Cost per 1000 gallons)								
Actual Variable Charge per 1000 Gallons Implemented	$ 15.00	$ 15.00	$ 16.00	$ 16.00	$ 16.00	$ 17.00	$ 17.00	$ 17.00
Actual Annual Variable Charge Revenue Generated	$ 823,066	$ 823,066	$ 877,937	$ 877,937	$ 877,937	$ 932,808	$ 932,808	$ 932,808
TOTAL ACTUAL MONTHLY USER CHARGE PER RESIDENTIAL USER	**$ 75.07**	**$ 75.07**	**$ 78.14**	**$ 78.14**	**$ 78.14**	**$ 81.21**	**$ 81.21**	**$ 81.21**
REVENUE GENERATED BY RATES	**$ 1,319,314**	**$ 1,319,314**	**$ 1,374,185**	**$ 1,374,185**	**$ 1,374,185**	**$ 1,429,056**	**$ 1,429,056**	**$ 1,429,056**
Replacement Fund - Can be used to offset costs	$ 1,617,501	$ 1,698,701	$ 1,779,901	$ 1,861,101	$ 1,942,301	$ 2,023,501	$ 2,104,701	$ 2,185,901

CITY OF FENNIMORE SEWER UTILITY
WASTEWATER BUDGET AND REVENUE PROJECTIONS
USING RURAL DEVELOPMENT 40-YEAR LOAN, NO FILTER

8/20/2015

ASSUMPTIONS

EXISTING DEBTS		Ann Payment	Ends			
Lincoln Ave Project		$ 24,389	Dec 2015			
Final Payment		$ 40,370	June 2016			
						Ann. % Incr.
WWTP ANNUAL O&M COSTS (includes taxes)	$ 385,400	Existing plant		$412,400	New plant	3%
WWTP ANNUAL REPLACEMENT FUND COSTS	$ 80,000	Existing plant		$81,200	New plant	
ANNUAL COLLECTION SYSTEM IMPROVEMENTS	$ 25,000					3%
PHOSPHORUS O&M COSTS				$ 25,000		
PHOSPHORUS REPLACEMENT FUND COSTS						
INTEREST INCOME RATE ASSUMED	0.5%					
OTHER INCOME ANNUAL INCREASE	0%					

FACILITIES UPGRADES	Capital Costs	Grant $	Net Cost	Interest Rate	Payback Yrs	Rate Factor	Yearly Paymt	Year
Wastewater Treatment Facility Upgrade - Phase 1 and LS SCADA	$9,000,000	$2,250,000	$6,750,000	3.000%	40	0.0433	$292,021	2017
Phase 2 - Increased Phosphorus Removal		$0	$0	2.750%	19	0.0683	$0	2021
Phase 3 - Additional Capacity		$0	$0	3.000%	19	0.0698	$0	2027
Other Projects		$0	$0	3.250%	19	0.0714	$0	

UNRESTRICTED CASH AND EQUIVALENTS AVAILABLE-12-31-2014 $ 560,134
REPLACEMENT FUND AS OF 12-31-2014 $ 1,009,101

Assumptions Notes:
Assumes RD 40-year loan for Phase 1 project, Capital Cost increased for interim financing
Includes all existing debt
Phase 2 - Increased Phosphorus Removal starts in 2021
No filter installation, includes costs for Statewide Variance at approximately $25,000 per year
No costs included for Phase 3
Vac Truck funded from Replacement Fund
Operation costs and collection system replacement costs are increased annually by 3%
MHI = $45,449, 2% of MHI = $909/yr, $75.75/month
Annual carryover goal is $300,000 (25% of expenses)

BUDGET ITEM	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
EXPENSES																	
Existing Loans	$ 24,389	$ 24,389	$ 40,370														
Annual Operation and Maintenance Costs	$ 385,400	$ 385,400	$ 396,962	$ 412,400	$ 424,772	$ 437,515	$ 450,641	$ 464,160	$ 478,085	$ 492,427	$ 507,200	$ 522,416	$ 538,088	$ 554,231	$ 570,858	$ 587,984	$ 605,623
Phosphorus Operation and Maintenance Costs								$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
WWTP Replacement Fund Deposit	$ 70,000	$ 80,000	$ 80,000	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200
Phosphorus Replacement Fund Deposit								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Collection System Improvements Fund	$ 25,000	$ 25,000	$ 25,000	$ 25,750	$ 26,523	$ 27,318	$ 28,138	$ 28,982	$ 29,851	$ 30,747	$ 31,669	$ 32,619	$ 33,598	$ 34,606	$ 35,644	$ 36,713	$ 37,815
Estimated Outside Services Costs - Facilities Upgrade		$ 50,000	$ 600,000	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
New WWTF Upgrade Loan Debt				$ 162,000	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021	$ 292,021
Phase 2 Debt								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Phase 3 Debt														$ -	$ -	$ -	$ -
Vac/Jet Truck - From Replacement Fund				$ 100,000													
Software/Computers/Copier - From Replacement Fund			$ 5,000	$ 10,000			$ 5,000										
Washington Street Sewer				$ 180,000													
Future projects - Collection System			$ 100,000	$ 68,750	$ 110,000	$ 87,500	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
TOTAL ANNUAL EXPENSES	**$ 504,789**	**$ 564,789**	**$ 1,247,332**	**$ 1,090,100**	**$ 934,516**	**$ 925,554**	**$ 956,999**	**$ 991,363**	**$ 1,006,157**	**$ 1,021,395**	**$ 1,037,090**	**$ 1,053,256**	**$ 1,069,907**	**$ 1,087,058**	**$ 1,104,723**	**$ 1,122,918**	**$ 1,141,659**
REVENUES																	
User Charge Revenues	$ 515,652	$ 527,183	$ 726,337	$ 726,337	$ 781,208	$ 935,216	$ 935,216	$ 990,087	$ 990,087	$ 1,044,959	$ 1,044,959	$ 1,044,959	$ 1,044,959	$ 1,099,830	$ 1,099,830	$ 1,127,265	$ 1,127,265
RD Reimbursement of Outside Services/Engineering				$ 700,000													
Cash from Replacement Fund			$ 5,000	$ 110,000			$ 5,000										
Use of Cash on Hand	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauled Waste/Other Revenues	$ 1,750	$ 2,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Income	$ 1,405	$ 2,801	$ 2,640	$ 73	$ 2,304	$ 1,549	$ 1,605	$ 1,530	$ 1,531	$ 1,458	$ 1,583	$ 1,631	$ 1,597	$ 1,480	$ 1,552	$ 1,535	$ 1,564
TOTAL ACTUAL ANNUAL REVENUE	**$ 518,807**	**$ 532,584**	**$ 733,977**	**$ 1,536,410**	**$ 783,513**	**$ 936,766**	**$ 941,822**	**$ 991,617**	**$ 991,618**	**$ 1,046,417**	**$ 1,046,542**	**$ 1,046,589**	**$ 1,046,556**	**$ 1,101,310**	**$ 1,101,381**	**$ 1,128,800**	**$ 1,128,829**
EXCESS REVENUE FOR THIS FISCAL YEAR	$ 14,018	$ (32,206)	$ (513,355)	$ 446,310	$ (151,003)	$ 11,211	$ (15,178)	$ 254	$ (14,539)	$ 25,022	$ 9,451	$ (6,667)	$ (23,352)	$ 14,252	$ (3,342)	$ 5,882	$ (12,830)
CARRYOVER FROM PREVIOUS YEAR		$ 560,134	$ 527,928	$ 14,573	$ 460,884	$ 309,881	$ 321,092	$ 305,915	$ 306,169	$ 291,630	$ 316,652	$ 326,103	$ 319,436	$ 296,084	$ 310,336	$ 306,994	$ 312,876
TOTAL AVAILABLE CARRYOVER	**$ 560,134**	**$ 527,928**	**$ 14,573**	**$ 460,884**	**$ 309,881**	**$ 321,092**	**$ 305,915**	**$ 306,169**	**$ 291,630**	**$ 316,652**	**$ 326,103**	**$ 319,436**	**$ 296,084**	**$ 310,336**	**$ 306,994**	**$ 312,876**	**$ 300,047**
REVENUE DETAILS																	
Equivalent Meters Added Per Year	0																
Monthly Usage per Equivalent Meter (gallons)	3,071																
Estimated Number of Equivalent Meters	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426
Estimated Annual Water Usage (gallons) (95% of 2014 Flows)	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050
ESTIMATED MONTHLY USER CHARGES																	
Fixed Charges on Debt																	
Actual Monthly Fixed Charge per Equivalent Meter Implemented	$ 13.82	$ 15.32	$ 20.00	$ 20.00	$ 20.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00
Actual Annual Fixed Charge Revenue Generated	$ 236,488	$ 262,156	$ 342,240	$ 342,240	$ 342,240	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248
Variable Charges - O, M & R Costs (Cost per 1000 gallons)																	
Actual Variable Charge per 1000 Gallons Implemented	$ 4.33	$ 4.83	$ 7.00	$ 7.00	$ 8.00	$ 8.00	$ 8.00	$ 9.00	$ 9.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 11.00	$ 11.00	$ 11.50	$ 11.50
Actual Annual Variable Charge Revenue Generated	$ 237,592	$ 265,027	$ 384,097	$ 384,097	$ 438,968	$ 438,968	$ 438,968	$ 493,839	$ 493,839	$ 548,711	$ 548,711	$ 548,711	$ 548,711	$ 603,582	$ 603,582	$ 631,017	$ 631,017
TOTAL ACTUAL MONTHLY USER CHARGE PER RESIDENTIAL USER	**$ 27.12**	**$ 30.15**	**$ 41.50**	**$ 41.50**	**$ 44.57**	**$ 53.57**	**$ 53.57**	**$ 56.64**	**$ 56.64**	**$ 59.71**	**$ 59.71**	**$ 59.71**	**$ 59.71**	**$ 62.78**	**$ 62.78**	**$ 64.32**	**$ 64.32**
REVENUE GENERATED BY RATES	**$ 474,079**	**$ 527,183**	**$ 726,337**	**$ 726,337**	**$ 781,208**	**$ 935,216**	**$ 935,216**	**$ 990,087**	**$ 990,087**	**$ 1,044,959**	**$ 1,044,959**	**$ 1,044,959**	**$ 1,044,959**	**$ 1,099,830**	**$ 1,099,830**	**$ 1,127,265**	**$ 1,127,265**
Replacement Fund - Can be used to offset costs	$ 1,009,101	$ 1,089,101	$ 1,164,101	$ 1,135,301	$ 1,216,501	$ 1,297,701	$ 1,373,901	$ 1,455,101	$ 1,536,301	$ 1,617,501	$ 1,698,701	$ 1,779,901	$ 1,861,101	$ 1,942,301	$ 2,023,501	$ 2,104,701	$ 2,185,901

CITY OF FENNIMORE SEWER UTILITY
WASTEWATER BUDGET AND REVENUE PROJECTIONS
USING RURAL DEVELOPMENT 40-YEAR LOAN, 25 YEAR PAYBACK, NO FILTEF

8/20/2015

ASSUMPTIONS

EXISTING DEBTS	Ann Payment	Ends
Lincoln Ave Project	$ 24,389	Dec 2015
Final Payment	$ 40,370	June 2016

					Ann. % Incr.
WWTP ANNUAL O&M COSTS (includes taxes)	$ 385,400	Existing plant	$412,400	New plant	3%
WWTP ANNUAL REPLACEMENT FUND COSTS	$ 80,000	Existing plant	$81,200	New plant	
ANNUAL COLLECTION SYSTEM IMPROVEMENTS	$ 25,000				3%
PHOSPHORUS O&M COSTS			$ 25,000		
PHOSPHORUS REPLACEMENT FUND COSTS					

INTEREST INCOME RATE ASSUMED	0.5%
OTHER INCOME ANNUAL INCREASE	0%

FACILITIES UPGRADES	Capital Costs	Grant $	Net Cost	Interest Rate	Payback Yrs	Rate Factor	Yearly Paymt	Year
Wastewater Treatment Facility Upgrade - Phase 1 and LS SCADA	$9,000,000	$2,250,000	$6,750,000	3.000%	25	0.0574	$387,638	2017
Phase 2 - Increased Phosphorus Removal		$0	$0	2.750%	19	0.0683	$0	2021
Phase 3 - Additional Capacity		$0	$0	3.000%	19	0.0698	$0	2027
Other Projects		$0	$0	3.250%	19	0.0714	$0	

UNRESTRICTED CASH AND EQUIVALENTS AVAILABLE-12-31-2014	$ 560,134
REPLACEMENT FUND AS OF 12-31-2014	$ 1,009,101

Assumptions Notes:
Assumes RD 40-year loan for Phase 1 project, Capital Cost increased for interim financing
Includes all existing debt
Phase 2 - Increased Phosphorus Removal starts in 2021
No filter installation, includes costs for Statewide Variance at approximately $25,000 per year
No costs included for Phase 3
Vac Truck funded from Replacement Fund
Operation costs and collection system replacement costs are increased annually by 3%
MHI = $45,449, 2% of MHI = $909/yr, $75.75/month
Annual carryover goal is $300,000 (25% of expenses)

BUDGET ITEM	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
EXPENSES																	
Existing Loans	$ 24,389	$ 24,389	$ 40,370														
Annual Operation and Maintenance Costs	$ 385,400	$ 385,400	$ 396,962	$ 412,400	$ 424,772	$ 437,515	$ 450,641	$ 464,160	$ 478,085	$ 492,427	$ 507,200	$ 522,416	$ 538,088	$ 554,231	$ 570,858	$ 587,984	$ 605,623
Phosphorus Operation and Maintenance Costs								$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
WWTP Replacement Fund Deposit	$ 70,000	$ 80,000	$ 80,000	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200	$ 81,200
Phosphorus Replacement Fund Deposit								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Collection System Improvements Fund	$ 25,000	$ 25,000	$ 25,000	$ 25,750	$ 26,523	$ 27,318	$ 28,138	$ 28,982	$ 29,851	$ 30,747	$ 31,669	$ 32,619	$ 33,598	$ 34,606	$ 35,644	$ 36,713	$ 37,815
Estimated Outside Services Costs - Facilities Upgrade		$ 50,000	$ 600,000	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
New WWTF Upgrade Loan Debt				$ 162,000	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638	$ 387,638
Phase 2 Debt								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Phase 3 Debt														$ -	$ -	$ -	$ -
Vac/Jet Truck - From Replacement Fund				$ 100,000													
Software/Computers/Copier - From Replacement Fund			$ 5,000	$ 10,000			$ 5,000										
Washington Street Sewer				$ 180,000													
Future projects - Collection System			$ 100,000	$ 68,750	$ 110,000	$ 87,500	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
TOTAL ANNUAL EXPENSES	**$ 504,789**	**$ 564,789**	**$ 1,247,332**	**$ 1,090,100**	**$ 1,030,133**	**$ 1,021,171**	**$ 1,052,616**	**$ 1,086,980**	**$ 1,101,774**	**$ 1,117,012**	**$ 1,132,707**	**$ 1,148,873**	**$ 1,165,525**	**$ 1,182,675**	**$ 1,200,340**	**$ 1,218,535**	**$ 1,237,276**
REVENUES																	
User Charge Revenues	$ 515,652	$ 527,183	$ 781,208	$ 781,208	$ 781,208	$ 1,017,523	$ 1,017,523	$ 1,099,830	$ 1,099,830	$ 1,127,265	$ 1,127,265	$ 1,127,265	$ 1,182,136	$ 1,182,136	$ 1,182,136	$ 1,237,007	$ 1,237,007
RD Reimbursement of Outside Services/Engineering				$ 700,000													
Cash from Replacement Fund			$ 5,000	$ 110,000			$ 5,000										
Use of Cash on Hand	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauled Waste/Other Revenues	$ 1,750	$ 2,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Income	$ 1,405	$ 2,801	$ 2,640	$ 347	$ 2,855	$ 1,624	$ 1,614	$ 1,472	$ 1,543	$ 1,541	$ 1,600	$ 1,581	$ 1,481	$ 1,571	$ 1,576	$ 1,493	$ 1,593
TOTAL ACTUAL ANNUAL REVENUE	**$ 518,807**	**$ 532,584**	**$ 788,848**	**$ 1,591,556**	**$ 784,063**	**$ 1,019,147**	**$ 1,024,137**	**$ 1,101,301**	**$ 1,101,373**	**$ 1,128,806**	**$ 1,128,865**	**$ 1,128,846**	**$ 1,183,617**	**$ 1,183,707**	**$ 1,183,713**	**$ 1,238,501**	**$ 1,238,600**
EXCESS REVENUE FOR THIS FISCAL YEAR	$ 14,018	$ (32,206)	$ (458,484)	$ 501,456	$ (246,070)	$ (2,024)	$ (28,479)	$ 14,321	$ (401)	$ 11,794	$ (3,842)	$ (20,027)	$ 18,092	$ 1,032	$ (16,628)	$ 19,965	$ 1,324
CARRYOVER FROM PREVIOUS YEAR		$ 560,134	$ 527,928	$ 69,445	$ 570,900	$ 324,830	$ 322,806	$ 294,327	$ 308,648	$ 308,247	$ 320,041	$ 316,199	$ 296,171	$ 314,264	$ 315,296	$ 298,669	$ 318,634
TOTAL AVAILABLE CARRYOVER	**$ 560,134**	**$ 527,928**	**$ 69,445**	**$ 570,900**	**$ 324,830**	**$ 322,806**	**$ 294,327**	**$ 308,648**	**$ 308,247**	**$ 320,041**	**$ 316,199**	**$ 296,171**	**$ 314,264**	**$ 315,296**	**$ 298,669**	**$ 318,634**	**$ 319,958**
REVENUE DETAILS																	
Equivalent Meters Added Per Year	0																
Monthly Usage per Equivalent Meter (gallons)	3,071																
Estimated Number of Equivalent Meters	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426	1426
Estimated Annual Water Usage (gallons) (95% of 2014 Flows)	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050	54,871,050
ESTIMATED MONTHLY USER CHARGES																	
Fixed Charges on Debt																	
Actual Monthly Fixed Charge per Equivalent Meter Implemented	$ 13.82	$ 15.32	$ 20.00	$ 20.00	$ 20.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00	$ 29.00
Actual Annual Fixed Charge Revenue Generated	$ 236,488	$ 262,156	$ 342,240	$ 342,240	$ 342,240	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248	$ 496,248
Variable Charges - O, M & R Costs (Cost per 1000 gallons)																	
Actual Variable Charge per 1000 Gallons Implemented	$ 4.33	$ 4.83	$ 8.00	$ 8.00	$ 8.00	$ 9.50	$ 9.50	$ 11.00	$ 11.00	$ 11.50	$ 11.50	$ 11.50	$ 12.50	$ 12.50	$ 12.50	$ 13.50	$ 13.50
Actual Annual Variable Charge Revenue Generated	$ 237,592	$ 265,027	$ 438,968	$ 438,968	$ 438,968	$ 521,275	$ 521,275	$ 603,582	$ 603,582	$ 631,017	$ 631,017	$ 631,017	$ 685,888	$ 685,888	$ 685,888	$ 740,759	$ 740,759
TOTAL ACTUAL MONTHLY USER CHARGE PER RESIDENTIAL USEF	**$ 27.12**	**$ 30.15**	**$ 44.57**	**$ 44.57**	**$ 44.57**	**$ 58.17**	**$ 58.17**	**$ 62.78**	**$ 62.78**	**$ 64.32**	**$ 64.32**	**$ 64.32**	**$ 67.39**	**$ 67.39**	**$ 67.39**	**$ 70.46**	**$ 70.46**
REVENUE GENERATED BY RATES	**$ 474,079**	**$ 527,183**	**$ 781,208**	**$ 781,208**	**$ 781,208**	**$ 1,017,523**	**$ 1,017,523**	**$ 1,099,830**	**$ 1,099,830**	**$ 1,127,265**	**$ 1,127,265**	**$ 1,127,265**	**$ 1,182,136**	**$ 1,182,136**	**$ 1,182,136**	**$ 1,237,007**	**$ 1,237,007**
Replacement Fund - Can be used to offset costs	$ 1,009,101	$ 1,089,101	$ 1,164,101	$ 1,135,301	$ 1,216,501	$ 1,297,701	$ 1,373,901	$ 1,455,101	$ 1,536,301	$ 1,617,501	$ 1,698,701	$ 1,779,901	$ 1,861,101	$ 1,942,301	$ 2,023,501	$ 2,104,701	$ 2,185,901

Appendix R

Public Input

Public Hearing Information and Comments to be Added after Hearing